

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

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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

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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  
\_\_\_\_\_

**REPLY COMMENTS OF AT&T CORP.**

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January 24, 2000

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## SUMMARY

The comments amply confirm that the Commission's price-cap system does not yet replicate the efficiency incentives of a competitive market. The comments also confirm that the best way to address that problem – and thereby to make this proceeding unnecessary – is to adopt the proposal of the Coalition for Affordable Local and Long Distance Services (“CALLS”) for the entire LEC industry. However, if the Commission does not adopt the CALLS plan, it should use this proceeding, not only to respond to the D.C. Circuit's remand in *USTA v. FCC*, but to make the price cap regulatory system more effective at replicating the efficiency incentives of a competitive market.

With respect to the historical component of the X-Factor, virtually all commenters agree that the Commission should retain the TFP methodology it adopted in 1997, which was endorsed by the D.C. Circuit, rather than switching to a different methodology. The only disagreement among the commenters thus centers on (1) whether the Commission should correct certain errors in its 1997 TFP study, principally relating to the cost of capital index, and (2) whether it should calculate productivity growth on an interstate-only or a total company basis.

As the comments overwhelmingly demonstrate, both corrections are necessary and appropriate. As the Commission's staff and various commenters have explained, the 1997 study's cost of capital index was fatally flawed, and the LECs' attempts to show otherwise are meritless. Similarly, as AT&T showed in its comments, the alleged difficulties in calculating an interstate-only X-Factor can be easily addressed by making certain adjustments to the Commission's X-Factor formula. Making these two corrections (with some additional refinements explained in Appendix A to these Reply Comments) leads to historical X-factors in the range of 11.1 to 11.8 percent for the remand period (1997-2000) and 10.2 to 10.7 percent for

the future. These results amply support the proposal by AT&T and others that the X-Factor should be set at a level of at least 10.0 percent for the remand period and 9.5 percent for the future.

In addition, as AT&T demonstrated in its Comments, a Consumer Productivity Dividend (CPD) of approximately 1.0 percent is appropriate to account for in the increase in productivity gains that can be expected from the elimination of sharing. The LECs' only counter-argument is that such a CPD might double count such increases if calculated by reference to years after 1995. However, AT&T anticipated that problem and accounted for it in its calculation of the CPD. The comments also support AT&T's proposal for a reinitialization of the price caps to place the caps where they would have been had the X-factor been at the appropriate level during the remand period.

All of these measures are essential if the price cap system is to replicate the efficiency incentives of a competitive market. The Commission should adopt them immediately if it does not adopt the CALLS proposal.

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**REPLY COMMENTS OF AT&T CORP.**

Pursuant to sections 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 reply comments in response to the Commission's Further Notice of Proposed Rulemaking, FCC 99-345, released November 15, 1999 ("*Further Notice*").

Preliminarily, as a number of commenters note, the Commission "has the opportunity to render this proceeding unnecessary" by adopting the proposal of the Coalition for Affordable Local and Long Distance Services ("CALLS"). SBC at 1-2; BellSouth at 47; Bell Atlantic at 1-2; Sprint at 2-3; GTE at 4. As SBC states, adoption of the CALLS proposal "would obviate the need for the Commission to set a new X-Factor, either for the remand period or going forward." SBC at 1-2. The CALLS Plan offers enormous public interest benefits and should be adopted expeditiously.

If the Commission does not adopt the CALLS Plan as to all the LECs, however, it must recalculate the X-Factor in response to the D.C. Circuit's remand in *USTA v. FCC*, 188 F.3d 521 (D.C. Cir. 1999). As shown in Section I below, the comments overwhelmingly demonstrate that the Commission should correct the serious errors in the capital-cost methodology used in the

1997 model, and should determine the X-factor on the basis of interstate revenues rather than combined interstate and intrastate revenues. As shown in Section II, the comments likewise confirm that the Commission should adopt a consumer productivity dividend (“CPD”) of at least 1.0 percent. Finally, as shown in Section III, the Commission should also order a full reinitialization of the price cap system, as it has in the past.

**I. THE COMMENTS CONFIRM THAT THE COMMISSION SHOULD ADOPT THE OPTION 2 STUDY, MODIFIED TO CALCULATE THE PRODUCTIVITY GROWTH OF INTERSTATE SERVICES ONLY, AND WITH CERTAIN OTHER CORRECTIONS.**

In the *Further Notice*, the Commission sought comment on which of three staff studies it should use as the basis for calculating the historical component of the X-factor. *Further Notice* ¶ 20. Virtually all commenters agree that the Commission should retain the basic TFP methodology and X-factor formula that it adopted in 1997 and that was not challenged in the D.C. Circuit. Therefore, the dispute among the commenters centers on only two issues: (1) whether the Commission should continue to rely on the 1997 study (“Option 1”), or make certain corrections to that study (“Option 2”); and (2) whether the Commission should calculate the X-factor on an interstate-only basis, rather than a total company basis (as both the Option 1 and 2 studies do). As explained below, the comments confirm that the Commission should use the Option 2 methodology, modified to calculate the X-factor on an interstate-only basis.

**A. The Comments Confirm That The Commission Should Choose The Option 2 Study Over The Option 1 Study.**

A number of commenters endorse the Option 2 study as superior to Option 1. *See, e.g.*, AT&T at 5; MPSC at 2. The LECs, through USTA, predictably oppose Option 2, and unjustly impugn the Option 2 study as “arbitrarily biased to increase the X-Factor.” USTA at 8. The Option 2 study, however, makes only two changes to the Option 1 study that have any appreciable impact on the X-factor: it contains a new cost of capital index, and it uses local dial

equipment minutes (“DEMs”) instead of access lines to measure output. Although the second of these changes would be moot if the Commission adopts an interstate-only approach (as it should), both changes are entirely correct as applied to total-company data. Indeed, if anything, the failure to make these changes that would itself be arbitrary.

### **1. Cost of Capital.**

As USTA correctly recognizes (at 11), “[t]he most significant difference between the 1997 TFP model and the 1999 staff study involves the treatment of cost of capital.” The Commission staff’s Option 2 model is based on a direct calculation of the LEC cost of capital that would prevail in a competitive market, as is AT&T’s alternative approach to calculating the cost of capital. AT&T App. A at 6-7. USTA’s experts attack the Commission staff’s approach, but their criticisms are meritless.

The analysis of USTA’s principal productivity expert, Gollop, accounts for almost the entire difference between the USTA study and the Commission’s Option 2 study. As AT&T shows in Reply Appendix A, Gollop’s analysis suffers from two fatal flaws. First, Gollop improperly uses Value Line’s rate of return series for 875 large companies for 1991-98 as a proxy for deriving the LECs’ cost of capital for the same period. The Value Line trend is necessarily distorted, because it begins in a recession year. Corporate earnings were artificially depressed during the recession of 1991 (8.5%) but have risen since then to 11.9% in 1998 – a 40% gain. Gollop’s assumption that LEC cost of capital has similarly risen 40% over the same period is unfounded, because the LECs’ earnings were robust in 1991. AT&T Reply App. A at 1-3.

Second, Gollop improperly uses these trends from the Value Line study to determine changes in the capital rental price. AT&T Reply App. A at 1-2. This is an apples-and-oranges calculation because the capital rental price in the FCC’s model and the Value Line rates of return

measure two different things. The FCC's capital rental price is measured with respect to the LECs' physical capital (*i.e.*, the LECs' "real" capital stock measured by a perpetual inventory method). By contrast, rates of return are measured with respect to a company's financial capital (*i.e.*, average net book investment). The LECs' physical capital, as measured by the FCC, has grown much faster than their average net investment. Accordingly, using rate of return data to estimate changes in the capital rental price tends to inflate the capital rental price and resulting levels of property income.<sup>1</sup> Thus, Gollop's conclusions are fundamentally unsound and should be rejected.

Indeed, Gollop's analysis is so off the mark that USTA's other expert, Vander Weide, does not agree with it. While Gollop contends that the LECs' cost of capital has sharply increased over the 1990s, Vander Weide contends merely that it has remained flat. But as Dr. William Lehr shows in the attached affidavit, AT&T Reply App. B, even Vander Weide's more restrained cost of capital estimates are biased upwards. Indeed, Vander Weide's analysis is flawed in two respects.

First, Vander Weide uses the S&P index as a proxy for the LECs' return on equity. Because the LECs are more capital intensive than the average firm in the S&P index, use of that index would tend to overstate return on equity. See Reply App. B at 8. Second, Vander Weide also uses the market value of equity to weight his already overstated return on equity in his weighted average cost of capital estimates. This again produces an upward bias in the cost of

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<sup>1</sup> To the extent that the staff's Option 2 study could be considered to be subject to this same criticism, the solution is to apply the changes in cost of capital to the RBOCs' aggregate rate of return rather than to the capital rental price, and then adjust property income to produce whatever rate of return is associated with the cost of capital. AT&T Reply App. A at 2-3. AT&T proposed this method as an alternative to the Option 2 method in its Comments. See AT&T App. A at 6-8.

measure, because the market value of equity has increased so substantially in the bull market of the 1990s. Although Vander Weide is attempting to determine the optimal forward-looking cost of capital, his method implies that the LECs' optimal future capital structure is a mere 17% debt financing, which is highly implausible. In short, as Dr. Lehr puts it, Vander Weide's approach "takes advantage of current market anomalies to develop excessive cost of capital estimates." Reply App. B at 9.

## **2. Dial Equipment Minutes**

The only other significant change that Gollop makes to the FCC study is to use access lines to measure local output, instead of dial equipment minutes (DEMs), as the Commission staff did in the Option 2 study. As long as the Commission is using an X-factor based on total company data, then DEMs are clearly the more appropriate measure of local output. *See* AT&T Reply App. A at 4-5; MCI at 9.

Indeed, as Gollop admits (at 20), "the choice of an appropriate output measure must follow from the very purpose of the X-factor as a public policy tool." USTA Att. 2. The purpose of the X-factor is to account for productivity gains in the provision of interstate access. Interstate access services are usage-sensitive, and the growth in usage on the network is a major source of productivity growth. Therefore, the usage-sensitive measure of local output – DEMs – is more appropriate than access lines. *See* AT&T Reply App. A at 4-5; Reply App. B at 2.

### **B. The Comments Confirm That The Commission Should Modify The Option 2 Study To Calculate The X-Factor Based On Interstate Data Only.**

As AT&T showed, and as a number of commenters agree, the Commission should also modify its X-factor calculations to estimate the productivity growth of interstate services only, rather than using total company data. MCI at 10-12; GSA at 6, 11; Ad Hoc at 33 (use imputed

X, because it measures interstate only). The comments confirm that the use of total company data results in a substantial downward bias in the X-factor. *See, e.g.*, MCI at 11-12.

Moreover, as AT&T showed in its comments, calculating the interstate-only X-factor is far easier than had previously been thought. The standard objection to using interstate only data has always been that it is too difficult to separate intrastate inputs from interstate inputs, because such costs are joint and common. In 1997, the Commission found that the record at that time did not provide enough information to determine an interstate X-factor, and the Court accepted the Commission's conclusion. *USTA*, 188 F.3d at 528-529. AT&T has shown, however, that the input terms in the Commission's X-factor formula cancel one another out. Accordingly, the X-factor can be calculated by a more direct method without the analytical difficulties of having to separate out interstate inputs. With the only substantial objection to an interstate-only X-factor removed, the Commission should not continue to rely on downwardly biased total company X-factors any longer. *See USTA*, 188 F.3d at 528-529 (if any party had demonstrated that total company data resulted in a downward bias in the X-factor, reversal would have been warranted).

Although the LECs argue that the Commission should not adopt an interstate only X-factor, they have said nothing to cast doubt on AT&T's analysis. They merely repeat the old argument that separating interstate from intrastate inputs is difficult. SBC at 3-5; Bell Atlantic at 4, 6-7; GTE at 13; U S WEST at 17-18; CBT at 4-5; BellSouth at 35-41. Every single LEC in this proceeding, however, as well as USTA, has endorsed the Commission's 1997 X-factor formula. Because AT&T has shown that an appropriate interstate X-factor can easily be calculated using the very formula endorsed by the LECs, they can no longer maintain any legitimate objection to an interstate only X-factor.

**C. The Commission Has Ample Discretion To Use The Methodology Advanced By AT&T To Establish The X-Factor Governing Both The Remand Period And Future Periods.**

Finally, there can be no doubt that the Commission has ample authority to revise its methodology on remand as advocated by AT&T. Indeed, only U S WEST disputes the point. See U S WEST at 5-10. However, U S WEST does not provide any legal support for its assertion that the Commission's decision to consider new data and develop new methodologies to prescribe an X-factor is inconsistent with the Court's remand order.<sup>2</sup> *Id.* at 5.

Indeed, the Court specifically remanded the case to the FCC "for further explanation." *USTA*, 188 F. 3d at 526. The Commission has, on several occasions, recognized that 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." See, e.g., Final Order On Remand, *Amendment of Parts 2, 22 and 25 of the Commission's Rules to Allocate 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*"); 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

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<sup>2</sup> U S WEST's position that new data and methodologies cannot be used by in any remand proceeding is directly contradicted by the holding in *Eastern Carolinas Broadcasting Co. v. FCC* where the court expressly recognized the Commission's long-standing policy of allowing parties to submit updated data concerning remanded issues, and to make new determinations based on those data. 762 F.2d 95, 98-104 (D.C. Cir. 1985) ("*Eastern Carolinas*"). For a complete discussion of this issue, see *AT&T* at 16-20.

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 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 disserve the public interest”).

Likewise, § 402 of the Communications Act, 47 U.S.C. § 402(h), does not preclude the Commission from considering new data or developing new methodologies when prescribing an X-factor for the remand period, much less the future. *See AT&T* at 18-19. Consequently, U S WEST’s startling conclusion that the Commission must rely on outdated data and ignore new methodologies on remand is inconsistent with established legal principles and with the Court’s remand order.

## **II. THE COMMENTS CONFIRM THAT THE COMMISSION SHOULD ADOPT A CONSUMER PRODUCTIVITY DIVIDEND OF AT LEAST 1.0 PERCENT.**

The comments also confirm AT&T’s analysis of the consumer productivity dividend issue. As the Commission recognizes in its *Further Notice*, the elimination of the sharing requirement can be expected to result in additional productivity gains for the LECs over and above their historical gains. *Further Notice* ¶ 44. The LECs do not dispute this fact. Indeed, even Dr. Taylor, USTA’s expert witness, concedes that the elimination of sharing could plausibly lead to an increase in productivity. USTA Att. 1 ¶ 53. Instead, the LECs argue that *some* of those productivity gains are already captured by X-factors and that *any* CPD adjustment would necessarily “double-count” those productivity gains. *See USTA Att. 1* ¶¶ 52-57.<sup>3</sup> This argument is logically flawed and should be rejected.

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<sup>3</sup> *See also SBC* at 4; *US WEST* at 20; *BellSouth* at 42-43.

The fact that “some” of the productivity gains associated with eliminating the sharing requirements might be captured by X-factors implies that some portion of those gains are not captured by X-factors. The correct approach, therefore, is simply to reduce the CPD adjustment by an amount equal to the level of the productivity gains attributed to the elimination of sharing that is already captured by the calculated X-factors. This is the approach AT&T proposed in its Comments. *See* AT&T Comments, App. C at 5.

AT&T estimates that at most 0.5 percent of the productivity gains associated with the elimination of sharing requirements have already been captured in the historical component of the X-factor. *See* AT&T App. C at 5.<sup>4</sup> Consequently, to avoid any risk of double counting those productivity gains, AT&T proposes to *reduce* its original estimate of the CPD from 1.5 percent to 1.0 percent (= 1.5 – 0.5). *Id.*

In short, AT&T’s estimate of the CPD adjustment already accounts for the only factual and theoretical problems identified by the LECs. The CPD adjustment proposed by AT&T does *not* “double-count” productivity gains. Moreover, AT&T’s estimate of the appropriate CPD adjustment is the only one that accounts for: (1) the unchallenged fact that elimination of the sharing requirements led to significant productivity gains and (2) that some of those productivity gains may already be captured by the historical component of the X-factor. Accordingly, the Commission should adopt AT&T’s proposed 1.0 percent CPD adjustment.

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<sup>4</sup> This estimate reflects minor refinements in AT&T’s analysis. The adjustments described in Reply Appendix A (at 7) lead to the conclusion that the estimated CPD should be reduced by 0.5 percent rather than 0.4 percent, as AT&T had previously calculated. *Compare* AT&T Comments, Appendix A.

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

As explained above, the record clearly establishes that the X-factor and the CPD adjustment have significantly underestimated the efficiency gains enjoyed by the LECs during the past several years. Therefore, Bell Atlantic's proposal to use the CPD and the X-factor as a basis for retroactive relief *in favor of the LECs* is groundless. *See Bell Atlantic* at 14-16. In any event, it would be inappropriate to use the CPD adjustment to provide retroactive relief. The CPD adjustment has never been used this way. Rather, it is used solely for the purposes of ensuring that consumers receive "the first benefits" of efficiencies gained from new regulations. *See Further Notice* ¶ 43. The Commission should not ignore this policy here.

Nevertheless, as noted in AT&T's initial comments, the Commission should act decisively to prevent past underestimations of the X factor from continuing to affect the price cap indices in the future. It should do so, moreover, by reinitializing the price caps and setting them equal to where they would have been if the X-factor had been set at the appropriate level since 1995.

Such a reinitialization would not be unusual. In both of the Commission's previous price cap review proceedings, the Commission reinitialized the price caps to prevent earlier errors in the estimation of the X-factor from infecting future periods. In both of these 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 529-530.

Reinitialization is especially important here because, as the Commission recognizes in the *Further Notice*, errors in the estimation of X-factors are not self-correcting, but continue to infect the price cap system and "may cause increasingly erroneous prices over time." *Further Notice* ¶ 45. As explained above, this 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 and set them where they would have been if the historical X-factor had been set at the appropriate level during the period from 1995 to 2000, with a CPD adjustment of 1.0 percent during the period from 1997 to 2000. *See AT&T* at 25.

**CONCLUSION**

For the reasons stated above and in AT&T's Comments, the Commission should prescribe historical X-factors of at least 10.1 and 9.5 percent for the remand and future periods, respectively; a CPD of at least 1.0 percent; and complete reinitialization.

Respectfully submitted,

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January 24, 2000

**Reply Appendix A**  
**CRITIQUE OF USTA'S TFP STUDY AND REVISED AT&T ESTIMATES**  
**Stephen Friedlander, AT&T**

In his report "Economic Assessment of the 1999 X-Factor Model Proposed by the FCC Staff," (included as Attachment 2 to USTA's comments), Frank M. Gollop makes several adjustments to the FCC model that purport to correct its flaws. These revisions have the net effect of reducing the 1991-98 average X-factor from 6.33% to 3.29%. This appendix provides a critique of the Gollop study. It presents updated X-factor estimates based on several modest revisions to the data used in preparing AT&T's comments.

The latest TFP study submitted by USTA suffers from one overriding flaw: Its cost of capital index is so aggressive in its design that it borders on the absurd. Based on his cost of capital calculations, Gollop would have us believe that the RBOCs have suffered shortfalls in their earnings in the range of \$5 billion to over \$7 billion per year for each of the last several years. The effect of these inflated capital cost estimates is to reduce the average X-factor for 1991 to 1998 by more than three percentage points relative to that estimated by the FCC staff in its 1999 X-factor model. A further downward bias in the X-factor results from Gollop's use of access lines instead of local minutes to measure the quantity of local output. Other revisions to the FCC model made by Gollop are relatively inconsequential.

**LEC cost of capital**

A major issue surrounding the Commission's TFP analysis is how to construct a cost of capital index for the LECs. The indexes put forth by the Commission and AT&T both reflect the downward trend in capital costs that has characterized U.S. capital markets over much of the 90s. The cost of capital index developed by USTA's consultant Gollop, on the other hand, implicitly assumes a sharply upward trend in capital costs over the period from 1991 to 1998. Not surprisingly, these divergent approaches result in markedly different values for the X-factor and account for virtually all of the difference between the FCC's results and those of the updated USTA study.

The most significant flaw in Gollop's analysis is its calculation of the capital rental price index shown on his Chart D9. Gollop uses the rate of return series reported by Value Line for its sample of 875 large industrial firms to measure the relevant opportunity cost of capital (Gollop, 7). Gollop's analysis, however, suffers from two serious deficiencies. First, the Value Line rate of return does not provide a reasonable estimate of the trend in the LECs' cost of capital over the period. And second, it is improperly applied in the TFP model to calculate the capital rental price index.

The Value Line rate of return, shown on Gollop's Table 1 (p. 8), declined precipitously in 1991 to a cyclical low of 8.5%, recovered in subsequent years, and stood at 11.9% in 1998. Gollop, however, the 1991 figure as his starting point and adjusts the earnings component of the capital rental price upward in subsequent years based on increases in the Value Line rate of return from 1991 forward.

The problem with these calculations is that corporate earnings in the U.S. were at depressed levels in 1991 because of the recession. Thus, any trend that uses 1991 earnings as the starting point will be distorted. Because a TFP study is essentially a trend analysis, it is the trend in these returns, rather than their absolute level, that drives the X-factor. Gollop's analysis uses the trend in Value Line returns from 1991 to 1998 to argue for a 40% increase in the cost of capital over the period – from 8.5% in 1991 to 11.9% in 1998. LEC earnings, however, were not depressed in 1991. The RBOCs' combined regulatory earnings provided a 10.1% return in 1991<sup>1</sup> – well above that for the Value Line industrials. Gollop improperly ratchets the RBOCs' earnings upward in subsequent years based on behavior of the Value Line return series.<sup>2</sup>

Gollop also errs by converting the changes in the Value Line series into changes in the capital rental price. Gollop follows the Commission's assumption that the capital rental price for 1991 represents a competitive level of earnings and proceeds to adjust the capital rental price in subsequent years based on changes in the Value Line returns. This adjustment is applied only to that portion of the rental price that is estimated to correspond to LEC earnings.

The major difficulty with this procedure is that it improperly mixes rate of return data with data on the capital rental price. It is not proper to add changes in rates of return to the capital rental price, since the two series measure different things. The capital rental price, as used in the FCC's model, refers to the price of one unit of physical capital, while rates of return are measured with respect to financial capital. Physical capital, which is intended to measure the "real" capital stock via a perpetual inventory model, differs substantially from financial capital measured in terms of average net book investment. Because the FCC's series on physical capital has grown by far more than has the RBOCs' average net investment, rate of return changes get "magnified" when added to the capital rental price. That is, the amount of revenue associated with a given basis point change in the capital rental price is substantially more than that associated with the same basis point change in rate of return. As a result, the increased revenue associated with a one basis point increase in the capital rental price causes the rate of return to increase by far more than one basis point, particularly in recent years of the study.<sup>3</sup>

The way to avoid this distortion is to apply changes in the cost of capital to the RBOCs' aggregate rate of return rather than to the capital rental price. Property income

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<sup>1</sup> Calculated from ARMIS 43-01 data.

<sup>2</sup> Another problem with the VL series is that it does not represent public utilities like the LECs that rely heavily on debt financing. As a result, the VL series does not adequately reflect the downward trend in interest costs experienced by the LECs.

<sup>3</sup> The same criticism applies to the capital cost index in the FCC's 1999 TFP Study, but not to the capital cost estimates in the Imputed X Study. Suggested modifications to the FCC's capital cost index are described below.

is then adjusted to produce whatever rate of return is associated with the cost of capital, as AT&T did in its analysis (See Appendix A of AT&T comments, p. 7).<sup>4</sup>

Gollop's procedure of applying the return adjustment only to that portion of the capital rental price corresponding to LEC earnings does not correct the problem. As shown on his Chart D9, the earnings component of the capital rental price is estimated to be 6.25% in 1991. Basis point changes in the Value Line return are then added to this figure causing it to grow to 9.65% in 1998 – an increase of 54% over its 1991 value. The effect of these calculations is thus to convert a 40% increase in the Value Line rate of return (from 8.5% in 1991 to 11.9% in 1998) into a 54% increase in the earnings component of the capital rental price. This inflated earnings ratio is then applied to the capital stock quantity, which, as noted above, has increased by far more than the RBOCs' net investment. This latter calculation further inflates the growth in required earnings, as shown in column P of Gollop's Chart D9.

The result of this extensive data manipulation becomes apparent when one compares the adjusted property income series shown in Gollop's Chart D9 with the unadjusted property income shown in the FCC's Table B-7. As shown in Table 1, Gollop's adjustments lead to the astonishing result that property income has to increase by nearly \$5.4 billion in 1998 -- from the unadjusted total of \$33.8 billion in the FCC study (column D) to Gollop's adjusted total of \$39.2 billion (column E) -- just to cover the RBOCs' cost of capital. The implausibility of this result is underscored by calculating the rates of return that would result from this adjustment. The \$5.4 billion increase in 1998 revenue increases the RBOCs' aggregate return on investment from 15.4% to 19.0%, as shown in columns C and H of Table 1. The end result is that, over the entire period, the RBOCs' implicit cost of capital increases by far more than the 40% increase in Value Line rates of return – nearly doubling from an initial rate of return of 10.14% in 1991 to the 19.0% level in 1998.

This 19.0% return on investment implies a return on equity of around 28%.<sup>5</sup> Gollop provides no evidence in support of LEC capital costs rising to such lofty heights. No such evidence exists. Even USTA's other consultant, James H. Vander Weide (USTA Attachment 5), estimates that the trend in the "market competitive cost of capital" has been relatively flat, going from 13.5% in 1991 to 13.78% in 1998.<sup>6</sup>

The impact of Gollop's capital cost methodology on the X-factor can be measured by changing the capital rental price in the FCC staff's model from its adjusted 1998 value of .162175 to the .248821 value used by Gollop. This has the effect of reducing the X-factor for the 1991-98 period from 6.33% to 3.19% and more than accounts for the

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<sup>4</sup> A similar approach is used in the FCC staff's Imputed X Study.

<sup>5</sup> The 28% figure is a rough approximation based on a 45%-55% debt-equity mix and a 7.26% interest rate on debt.

<sup>6</sup> Vander Weide's analysis is analyzed elsewhere in AT&T's reply comments.

difference between Gollop's results and those of the FCC. (The net effect of the other changes made by Gollop is a slight increase in the X-factor.)

Gollop makes two other criticisms of the staff study that are likewise without merit.

- First, he faults the FCC for making an adjustment for income tax changes associated with adjustments to LEC earnings. Gollop asserts that the "reassignment of some fraction of dollar earnings from the 'normal' (opportunity cost) to 'excess' categories will have absolutely no impact on the Internal Revenue Service's view of the LECs' income tax liability" (p.16). This statement totally misses the point. The issue here is not the LECs' actual income tax liability, but what their income taxes would be if their earnings were equal to the cost of capital. Income taxes are an integral component of annualized capital-related costs, which consist of depreciation, interest expense, return on equity, and income taxes associated with that return. Any adjustment that alters the return on equity should thus be accompanied by an adjustment to income taxes.<sup>7</sup>
- Gollop claims that the staff's treatment of the LECs' capital cost is inconsistent with the BLS index of input prices. He alleges that using an *external* rate of return for the LECs' capital cost requires a similar approach for the BLS index (pp. 16-17). This assertion is puzzling. Since the BLS index represents the entire U.S. nonfarm business sector, it is not clear what such an *external* rate of return would consist of. The BLS index implicitly includes an economy-wide capital cost – which is consistent with using a capital cost for the LECs based on economy-wide returns. There is no apparent inconsistency or asymmetric treatment here.

### **Measurement of local output**

The other significant modification made by Gollop to the FCC study is to replace DEMs (dial equipment minutes) with access lines as a measure of local output. Gollop contends that if the Commission is intent on using a single variable to measure local output, it should use access lines rather than local DEMs, since more than 80% of local revenue is generated from lines (pp. 20-21).

Gollop's proposal might be reasonable if the X-factor was being used to regulate charges for local service. However, as Gollop himself emphasizes, "The choice of an appropriate output measure must follow from the very purpose of the X-factor as a public policy tool" (p. 20). The purpose of the FCC's X-factor is to regulate the prices of interstate access – not local service prices. Unlike local services, interstate access prices are highly usage sensitive. As long as the X-factor is determined on the basis of total

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<sup>7</sup> The FCC may have created some confusion here by applying the income tax adjustment to total operating expense rather than to property income. Since property income by definition includes income taxes, the tax adjustment should be applied to property income. This does not appear to have any effect on estimated X-factors, however.

company data, rather than interstate-only data, use of local DEMs is clearly appropriate. Growth in usage on the network is a major source of productivity growth and contributes to lower per minute costs for all services that use the network, including switched access.

Gollop also contends that the erratic movement in DEMs, as reflected in the growth rates for 1990 and 1997, introduces a substantial bias in the X-factor (p. 21). This is a non-issue. While this may result in year-to-year fluctuations in X, such fluctuations should not be of any concern, since it is the trend over multi-year periods that matters.

Measurement of local output using DEMs is not the ideal solution, however. As AT&T and others have urged repeatedly, the Commission should rely on interstate data to prescribe the X-factor and thereby avoid the problems inherent in measuring local output as well as inputs.

### **Other issues**

Other issues raised by Gollop are generally of little consequence, and are addressed only briefly here.

Labor expense: Gollop claims that the FCC's labor expense adjustment is flawed because it effectively "disallows" severance payments. Gollop says that, because these are legitimate costs that are required by market forces, they should be allocated to labor expense for other years or treated as a capital expense (pp. 18-19).

Once again, Gollop's critique misses the point. The question is not whether these expenses represent legitimate costs, but whether unusually high expenses in a single year have a distorting effect on the trend in labor costs. If expenses were unusually high in either the first year or last year of the period being studied, the trend for that period will be biased and some kind of adjustment is clearly appropriate.

As a practical matter, however, most of the adjustments made by the FCC were for years in between 1990 and 1998, as shown on the FCC's Table B-5, and therefore have little effect on the trend from 1990 to 1998. According to AT&T's estimate, the FCC's downward adjustment of \$350 million for 1998 has the effect of raising the average X-factor for 1991-98 by only .066 percentage points.

Price of labor: Gollop also notes some anomalies in the labor price series contained in the 1999 Staff study. But this turns out to be a non-issue. As AT&T's analysis shows, variations in either input prices or input quantities have no effect on the X-factor.<sup>8</sup> Moreover, year-to-year fluctuations in the data are of little concern. As shown in Gollop's Table 5 (p. 27), the overall increase in the labor price from 1990 to 1998 (which determines the average X-factor for 1991-98) in the 1999 Staff Model is very similar to that in both USTA's 9/99 filing and the labor price series for the U.S. nonfarm business sector.

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<sup>8</sup> AT&T Comments, Appendix A.

U.S. productivity data: Gollop points out that data on U.S. multifactor productivity will be revised sometime next spring, based on recent revisions in the government's GDP accounts (p. 32-33). On the basis of recent revisions in labor productivity growth rates, Gollop anticipates that growth rates for multifactor productivity will be revised upward by about 0.5 percentage points per year. According to Gollop, incorporating these revisions into the Commission's TFP model will decrease both the TFP differential and the measured X-factor.

If Gollop is correct, a better remedy would be to adopt AT&T's suggestion that the GDP price index be used in place of the U.S. input price and productivity indexes as a measure of inflation. The GDP-PI series used in AT&T's analysis already reflects the latest revisions to the national income and product accounts. Moreover, as explained in AT&T's comments (Appendix A, pp. 5-6), that series provides a more appropriate measure of inflation than does the FCC's use of U.S. input prices minus U.S. productivity growth.<sup>9</sup>

### **Revised AT&T results**

Also included here is an updated version of the charts included in Appendix A of AT&T's comments, which incorporate the following revisions:

- Data on RBOC interstate earnings and average net investment for 1997 and 1998, shown in Tables A-1a and A-2a, have been updated to reflect current ARMIS data from the FCC's web site. Revisions made by Gollop, primarily to exclude SNET from the RBOC data, have also been incorporated into these calculations.
- Where the FCC staff's cost of capital index is used, changes in the cost of capital (as measured by Moody's Baa corporate bond rate) are applied to the RBOCs' aggregate rate of return rather than to the capital rental price, with an 11.25% cost of capital assumed for 1990 and 1991. With that adjustment, the cost of capital declines to 8.67% in 1998, just as it does in the FCC's Imputed X Study.<sup>10</sup> Property income is then adjusted to produce whatever rate of return is associated with the cost of capital, as is done for AT&T's capital cost index. No adjustments are made for the years before 1990.
- The tax adjustment shown in Table A-2a (which incorporates AT&T's capital cost index approach) has also been revised to correct an error in the formula used to calculate this adjustment. The original calculation applied the 39% marginal tax rate to after-tax earnings rather than to before-tax earnings. The revised tax adjustment is

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<sup>9</sup> See "Comprehensive Revision of the National Income and Product Accounts," U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, November 1999, pp. 2-7.

<sup>10</sup> AT&T estimates that the capital cost index used in the FCC's 1999 TFP Study produces a rate of return of only 6.5% in 1998. The modifications presented here thus make the capital cost index more consistent with the capital cost assumption used in the Imputed X Study.

calculated by multiplying the earnings adjustment, which refers to after-tax earnings, by the factor  $[\frac{.39}{1-.39}]$ . The same adjustment is also reflected in the tables that rely upon the FCC's capital cost adjustment.

Where applicable, these new values and adjustments are used in Table A-3a to recompute X-factors using total-company data, as in the staff's Table B-12, with the minor correction described in Appendix A of AT&T's comments. These changes result in slightly higher average X-factors than reported by either the FCC staff or by AT&T in its Appendix A.

Next, these same adjustments are used to recalculate interstate-only X-factors under AT&T's "direct calculation" method, but using the revised FCC cost of capital index. Annual X-factors are shown in Table A-4a. Table A-5a then presents estimated aggregate interstate X-factors using the Commission's "rolling average" methodology. The adjustments described above increase the 1986-95 X-factors by about 1.0 percentage points, and increase the 1986-98 X-factors by about 0.7 percentage points.

Similar interstate X-factor calculations based on AT&T's capital cost index are presented in Table A-6a, and rolling averages based on this approach are shown in Table A-7a. The net effect of these revisions is to raise the median X-factor for 1986-95 by about .2 percentage points and the median X-factor for 1986-98 by about .5 percentage points.

The net result of these changes is that the calculated historical X-factors for 1986-95 (based on the rolling average methodology) are all now in the range of 11.1 to 11.8 percent, and the calculated historical X-factors for 1986-98 are now in the range of 10.2 to 10.7 percent.

Next, Table A-8a presents revised calculations of AT&T's earlier "Performance-Based Model," based on the assumption that inputs grow at the same rates for interstate access as for the LECs' other regulated telephone services. The interstate TFP growth rates generated by this model are then reported for various periods in Table A-9a, along with total-company TFP growth rates from Table A-3a. These revised calculations show that the TFP growth rates reported in Table A-9 of AT&T's comments are understated, and therefore that the consumer product dividend (CPD) implied by those growth rates is even higher than AT&T estimated in Appendix C of its comments.

Finally, the adjustments described above have a slight impact on the adjustment to the CPD that AT&T adopted to avoid any risk of double-counting the effects of the (partial) elimination of sharing during 1996-1998. When the realized X-factors for those years are reduced by 1.5 percent (the CPD as calculated based on the entire data series), the rolling average of X-factors calculated for the 1986-1998 period declines from the approximately 10.40 percent reported in Table A-7a to 9.93 percent, and from the approximately 10.23 percent reported in Table A-5a to 9.76 percent. Thus, it would appear that that the appropriate adjustment to the CPD is about 0.5 percent rather than 0.4 percent.

For further explanation of results and methodology, see AT&T's comments, Appendix A and Appendix C.

**Table A-1a. LEC Revenue (\$) by Type of Service<sup>1</sup> - 1985-1998**

Year	Local Service Revenue	Intrastate Toll and		Total Revenue (B)
		Intrastate Access Service Revenue	Interstate Service Revenue (A)	
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	\$44,993,354,000	\$11,978,176,000	\$19,898,362,000	\$76,869,892,000

**Adjusted Interstate Service Revenue based on FCC adjustments**

Adjusted Total Factor Payments (C)	Adjusted Interstate Service Revenue (A*C/B)	Growth Rate (%)
\$54,373,955,573	\$14,366,305,727	
\$57,624,662,544	\$15,459,541,700	7.33408
\$58,677,879,670	\$15,360,313,555	-0.64393
\$60,028,411,000	\$15,806,448,000	2.86308
\$60,586,565,000	\$15,745,189,000	-0.38831
\$62,753,392,152	\$15,877,551,795	0.83714
\$63,226,128,240	\$15,756,278,385	-0.76674
\$61,181,485,720	\$15,227,275,715	-3.41506
\$62,624,857,991	\$15,638,911,467	2.66739
\$63,803,171,511	\$16,232,500,431	3.72533
\$65,001,447,981	\$16,746,693,812	3.11854
\$66,131,406,167	\$16,928,858,084	1.08189
\$66,612,633,949	\$17,078,102,113	0.87773
\$66,832,310,446	\$17,300,056,914	1.29127

<sup>1</sup>This excludes miscellaneous services

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

Table A-2a. LEC Revenue (\$) by Type of Service<sup>1</sup> - 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	\$44,993,354,000	\$11,978,176,000	\$19,898,362,000	\$76,869,892,000

<sup>1</sup>This excludes miscellaneous services

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=0.64*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	-\$227,348	\$14,901,010,958	-5.51058
\$3,065,010	\$25,191,906	12.17%	11.25%	\$2,834,089	-\$230,921	-\$147,637	\$15,082,786,665	1.21251
\$3,290,715	\$24,875,599	13.23%	10.88%	\$2,705,399	-\$585,316	-\$374,216	\$14,808,175,190	-1.83747
\$3,467,862	\$24,759,133	14.01%	10.50%	\$2,600,063	-\$867,799	-\$554,819	\$14,918,537,841	0.74252
\$3,446,525	\$24,779,745	13.91%	10.13%	\$2,509,480	-\$937,045	-\$599,090	\$15,564,434,938	4.23839
\$3,506,389	\$25,461,013	13.77%	9.75%	\$2,483,176	-\$1,023,213	-\$654,181	\$15,955,427,369	2.48105
\$3,756,542	\$26,132,272	14.38%	9.38%	\$2,450,834	-\$1,305,708	-\$834,791	\$16,270,697,312	1.95667
\$3,779,276	\$25,827,956	14.63%	9.00%	\$2,325,623	-\$1,453,653	-\$929,379	\$16,499,837,413	1.39847
\$3,990,567	\$25,911,261	15.40%	8.63%	\$2,236,142	-\$1,754,425	-\$1,121,674	\$17,022,262,632	3.11715

Source: ARMIS 43-01

Tax factor:

0.63934

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

Year	U.S. Nonfarm Business Sector					U.S. Nonfarm Business Sector LECs'				
	TFP Growth Rate (%) A	Output Growth Rate (%) B	Input Growth Rate (%) C	LECs' TFP Growth Rate (%) D=B-C	TFP Differential (%) E=D-A	Input Price Growth Rate (%) F	Input Price Growth Rate (%) G	Input Price Differential (%) H=F-G	X-factor (%) I=E+H	Previous X-factor <sup>1</sup> (%) J
1986	1.10166	3.20079	0.23097	2.96981	1.86815	2.80830	5.19735	-2.38905	-0.52090	-0.5
1987	-0.39920	3.76640	0.54947	3.21692	3.61613	2.53178	0.70253	1.82925	5.44538	5
1988	0.29955	6.51199	4.13623	2.37576	2.07621	3.72958	-1.40072	5.13030	7.20651	5
1989	0.19920	4.38736	2.63658	1.75078	1.55158	3.03629	-2.41383	5.45011	7.00169	7.9
1990	-0.69895	4.76136	-0.62394	5.38530	6.08425	3.30913	4.31281	-1.00369	5.08057	8.8
1991	-1.41274	2.61222	1.97867	0.63355	2.04628	2.05824	-1.39313	3.45137	5.49765	5.8
1992	1.61294	3.51156	-0.77999	4.29155	2.67861	2.88104	-2.61511	5.49614	8.17476	3.4
1993	0.09995	5.83136	0.79511	5.03625	4.93630	3.71664	1.49236	2.22428	7.16058	4.7
1994	0.39880	5.41556	2.91809	2.49747	2.09867	3.50341	-1.19592	4.69933	6.79800	5.4
1995	0.29806	5.98474	0.82671	5.15803	4.85997	1.96268	1.12891	0.83377	5.69374	6.8
1996	1.47713	8.22067	-3.41354	11.63421	10.15708	1.38258	5.65246	-4.26988	5.88720	
1997	0.39024	8.81648	4.07661	4.73987	4.34963	1.89887	-3.43866	5.33753	9.68715	
1998	0.59259	6.15546	0.01784	6.13762	5.54502	0.71810	0.24889	0.46921	6.01424	
				avg <sup>2</sup> (86-98)	3.98984			2.09682	6.08666	
				var <sup>3</sup> (86-98)	5.38031			9.67041	5.13108	
				avg(91-98)	4.58395			2.28022	6.86417	
				var(91-98)	6.06067			9.39899	1.83666	
				avg(86-95)	3.18162			2.57218	5.75380	5.23
				var(86-95)	2.28288			6.97695	5.25875	5.93
				avg(91-95)	3.32397			3.34098	6.66495	5.22
				var(91-95)	1.70185			2.80703	0.96974	1.29

<sup>1</sup> X-factor reported in the 1997 Price Cap Review Order

<sup>2</sup> avg denotes the arithmetic mean of the series

<sup>3</sup> 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-4a. Direct Calculation of the LECs' Price Cap X-Factor (excluding the Consumer Productivity Dividend) - 1985-1998**  
**Based on Revised 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	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	-0.643926	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	3.51395	5.25549	11.49069	0.837142	14.66163	3.9	14.55355	14.66163
1991	-1.41274	2.05824	2.61222	0.75050	5.33269	9.83068	-0.766736	14.06839	3.4	13.99741	14.06839
1992	1.61294	2.88104	3.51156	-3.28730	8.06697	5.95758	-3.415064	10.64074	2.2	11.57265	10.64074
1993	0.09995	3.71664	5.83136	2.33177	7.11628	11.26657	2.667386	12.21588	2.7	11.29918	12.21588
1994	0.39880	3.50341	5.41556	1.86406	6.65611	8.70504	3.72533	8.08432	2.1	7.07971	8.08432
1995	0.29806	1.96268	5.98474	1.86066	5.78869	9.58520	3.118542	8.13128	2.1	8.56666	8.13128
1996	1.47713	1.38258	8.22067	1.72342	6.40270	9.62733	1.081889	8.45089	1.8	10.34544	6.95089
1997	0.39024	1.89887	8.81648	0.72505	9.60006	7.77268	0.877732	8.40357	1.7	8.59494	6.90357
1998	0.59259	0.71810	6.15546	0.32924	5.95173	9.04564	1.291273	7.87987	1.2	8.95437	6.37987
				avg <sup>2</sup> (86-98)	6.00948			9.64888		9.95062	9.30272
				var <sup>3</sup> (86-98)	5.52476			13.73368		12.59819	15.10516
				avg(91-98)	6.86440			9.73437		10.05130	9.17187
				var(91-98)	1.69828			4.73915		4.23609	6.94228
				avg(86-95)	5.61687			10.07011		10.14633	10.07011
				var(86-95)	5.72303			17.06482		16.04072	17.06482
				avg(91-95)	6.59215			10.62812		10.50312	10.62812
				var(91-95)	0.93713			5.41234		5.89145	5.41234

## Table A-5a. Average Interstate X-Factors

Based on Direct Calculation and Revised FCC Cost of Capital Index

(From Table A-4)

	Interstate X- factor (%)	Interstate X- factor (%) based on GDPPI
1986 to 1995	10.070	10.146
1987 to 1995	11.243	11.273
1988 to 1995	11.229	11.266
1989 to 1995	11.011	11.058
1990 to 1995	11.300	11.178
1991 to 1995	10.628	10.503
Mean:	10.913	10.904
Median:	<b>11.120</b>	<b>11.118</b>
1986 to 1998	9.649	9.951
1987 to 1998	10.494	10.779
1988 to 1998	10.415	10.729
1989 to 1998	10.181	10.530
1990 to 1998	10.282	10.552
1991 to 1998	9.734	10.051
Mean:	10.126	10.432
Median:	<b>10.231</b>	<b>10.541</b>

**Table A-6a. 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 (%) 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 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	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	3.51395	5.25549	11.49069	-5.51058	21.00935	3.9	20.90127	21.00935
1991	-1.41274	2.05824	2.61222	0.75050	5.33269	9.83068	1.212508	12.08914	3.4	12.01817	12.08914
1992	1.61294	2.88104	3.51156	-2.10522	6.88488	5.95758	-1.83747	9.06315	2.2	9.99505	9.06315
1993	0.09995	3.71664	5.83136	4.01887	5.42918	11.26657	0.742518	14.14074	2.7	13.22405	14.14074
1994	0.39880	3.50341	5.41556	-0.86102	9.38120	8.70504	4.238391	7.57126	2.1	6.56665	7.57126
1995	0.29806	1.96268	5.98474	1.96378	5.68558	9.58520	2.481055	8.76876	2.1	9.20415	8.76876
1996	1.47713	1.38258	8.22067	1.18184	6.94428	9.62733	1.956673	7.57611	1.8	9.47066	6.07611
1997	0.39024	1.89887	8.81648	0.30089	10.02421	7.77268	1.398475	7.88283	1.7	8.07420	6.38283
1998	0.59259	0.71810	6.15546	0.95756	5.32341	9.04564	3.117153	6.05399	1.2	7.12849	4.55399
				avg (86-98)	6.01641			9.77340		10.07514	9.42724
				var (86-98)	6.37577			22.78475		20.54240	24.98583
				avg(91-98)	6.87568			9.14325		9.46018	8.58075
				var(91-98)	3.06184			6.23239		4.59900	8.97855
				avg(86-95)	5.59215			10.55412		10.63034	10.55412
				var(86-95)	6.36814			26.78701		25.09167	26.78701
				avg(91-95)	6.54271			10.32661		10.20161	10.32661
				var(91-95)	2.32257			5.85386		5.33711	5.85386