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February 22, 2005

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: CC 94-1, Price Cap Performance Review for Local
Exchange Carriers; CC 96-262, Access Charge Reform;
ERRATUM

Dear Ms. Dortch:

On Oct. 1, 2004, Verizon filed Reply Comments in the above-referenced docket. It has recently come to our attention that the electronic version of the comments available on ECFS is missing page 13. Attached please find a scanned copy of our Reply Comments that contains this missing page.

Thank you for your attention to this matter. If you should have any questions please do not hesitate to call me at (703) 351-3063.

Sincerely,

A handwritten signature in black ink that reads "Jennifer L. Hoh".

Jennifer L. Hoh

Attachments

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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 VERIZON

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October 1, 2004

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Before the
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In the Matter of

Price Cap Performance Review
For Local Exchange Carriers

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REPLY COMMENTS OF VERIZON¹

I. Introduction and Summary.

AT&T's comments go well beyond the scope of its petition for reconsideration of the *1997 Price Cap Review Order*² and, in any event, are rendered moot by the *CALLS Order*,³ which resolved all of the issues that AT&T had raised in the petition for reconsideration. In addition, AT&T's continued pursuit of this petition abrogates its commitments as a voluntary participant in the CALLS plan not to seek revision of the X-factor for the period prior to the adoption of CALLS. Insofar as AT&T argues for changes to the price cap rules that would apply *after* the CALLS plan expires in 2005, its arguments have no relevance to the *1997 Price Cap Review*

¹ The Verizon telephone companies ("Verizon") are the affiliated local telephone companies of Verizon Communications Inc. These companies are listed in Attachment A.

² *Price Cap Performance Review for Local Exchange Carriers, Access Charge Reform*, Fourth Report and Order in CC Docket No. 94-1 and Second Report and Order in CC Docket No. 96-262, 12 FCC Rcd 16642 (1997) ("*1997 Price Cap Review Order*"), *aff'd in part, rev'd in part sub nom. USTA v. FCC*, 188 F.3d 521 (D.C. Cir. 1999).

³ *Access Charge Reform; Price Cap Performance Review for Local Exchange Carriers*, 15 FCC Rcd 12962 (2000) ("*CALLS Order*").

Order and will be addressed in other proceedings, such as the intercarrier compensation proceeding.⁴ Finally, even if the Commission considered the merits of AT&T's petition (which it should not) AT&T has not cured the evidentiary and analytical deficiencies that caused the Court to reverse and remand the Commission's X-factor prescription in the *1997 Price Cap Review Order*.

II. Background

In the *1997 Price Cap Review Order*, the Commission revised the price cap plan by increasing the X-factor, which previously ranged from 3.3 to 5.3 percent, to 6.5 percent, including a productivity factor of 6.0 percent and a consumer productivity dividend ("CPD") of 0.5 percent.⁵ The Commission also required the price cap carriers to adjust their price cap indexes in their 1997 annual access tariff filings as if the 6.5 percent X-factor had been in effect since the 1996 annual access tariff filings.⁶

AT&T filed a petition for reconsideration of that order, arguing that (1) the Commission should have adopted a much higher X-factor based on an analysis of interstate-only productivity rather than the total company productivity estimate upon which the Commission had relied; (2) the Commission should have eliminated the lower formula adjustment at the same time that it eliminated sharing; and (3) the Commission should have applied the revised X-factor to the price cap indexes back to the 1995 annual access tariff filing.

⁴ *Developing a Unified Intercarrier Compensation Regime*, 16 FCC Rcd 9610, ¶ 97 (2001) ("*IC Rulemaking*") (this proceeding to address the question "What comes after CALLS?").

⁵ See *1997 Price Cap Review Order*, ¶ 145.

⁶ See *id.* at ¶ 179.

1. *USTA v. FCC*

Several price cap carriers filed an appeal of the *1997 Price Cap Review Order*, challenging the Commission's basis for increasing the X-factor. They argued that the Commission arbitrarily rejected data that were inconsistent with its approach (and would have resulted in a much lower X-factor) and relied on certain AT&T data (which had increased the X-factor) that the Commission had rejected for other reasons. They also challenged the inclusion of the CPD in the X-factor and the Commission's retroactive application of the CPD. MCI also filed an appeal of the order, arguing that (1) the Commission erred in relying on an analysis of total company productivity rather than productivity only for interstate operations; (2) the Commission should have required the price cap carriers to re-initialize their price cap indexes back to 1995; and (3) the Commission erred in eliminating sharing while retaining the lower formula adjustment.

In *USTA v. FCC*,⁷ the Court agreed with the price cap carriers and rejected the Commission's decision to increase the X-factor. The Court found that the Commission had "failed to state a coherent theory supporting its choice of 6.0%" and remanded the case for further explanation.⁸ It found it "mystifying" that the Commission had rejected data that pointed to a lower productivity factor simply because the data diverged from other numbers.⁹ It also found that the Commission's finding of a trend of increasing productivity was not supported by the data, which "thrash[ed] about wildly" and appeared, at best, to display cyclical patterns.¹⁰ The Court also found that it was "irrational" for the Commission to have relied on some aspects of

⁷ *United States Telephone Association, et al. v. FCC*, 188 F.3d 521 (D.C. Cir. 1999).

⁸ *Id.* at 526. The Court also remanded the Commission's retention of the 0.5 percent CPD.

⁹ *See id.* at 525.

¹⁰ *See id.* at 526.

AT&T's X-factor analysis when it had already rejected that analysis.¹¹ In sum, the Court found that the Commission had "failed to state a coherent theory" for increasing the X-factor beyond the previous levels, finding that "[n]one of the reasons given for choosing 6.0% holds water."¹²

The Court also rejected MCI's arguments that the productivity factor should have been even higher than 6.0 percent based on an analysis of local exchange carrier productivity just for interstate operations.¹³ The Court found that "it is not clear that 'interstate productivity,' as opposed to total company productivity, is measurable, or even economically well-defined," because the Commission's productivity analysis was based on measurements of inputs, and "there is no obviously meaningful way to segregate LEC interstate and intrastate inputs because, as is undisputed, 'interstate and intrastate services are usually provided over common facilities.'"¹⁴ In particular, the Court rejected the same arguments that AT&T raised in its petition for reconsideration that interstate productivity could be estimated by relying on higher demand growth for interstate services and on an assumption of equal growth rates for interstate and intrastate inputs.¹⁵ The Court found that AT&T "offered no explanation why that assumption was economically justified, much less one so compelling that it would be error for the FCC to reject it."¹⁶ The Court also rejected MCI's argument, which AT&T also raised in its petition for reconsideration, that higher interstate productivity should be inferred from higher growth in

¹¹ *See id.*

¹² *Id.* at 525.

¹³ *See id.* at 528-529.

¹⁴ *Id.* at 528.

¹⁵ *See* Petition of AT&T Corp. for Partial Reconsideration of the Commission's X-Factor Order, CC Docket Nos. 94-1, 96-262, at 9 (filed July 11, 1997) ("AT&T PFR").

¹⁶ 188 F.3d at 528.

outputs, finding it to be inconsistent with the Commission's decision to adopt a productivity-based X-factor, which relied on changes in inputs.¹⁷

The Court also rejected MCI's challenge to elimination of the sharing obligation, in which MCI, like AT&T in its petition for reconsideration, argued that it was arbitrary to eliminate sharing while retaining the lower formula adjustment.¹⁸ The Court found that "the FCC gave a good reason for creating this asymmetry – the Constitution's takings clause, which forbids imposition of confiscatory rates without just compensation. . . . The Commission thus avoided raising a non-trivial constitutional question, one that has no analogy at the upper end of the range of allowable rates."¹⁹

Finally, the Court rejected MCI's arguments that the Commission should have re-initialized the price cap indexes by applying the higher X-factor back to 1995.²⁰ MCI, like AT&T in its petition for reconsideration, had argued that re-initialization back to 1995 was required by the Commission's finding that the 1995 X-factor had been understated.²¹ However, the Court endorsed the Commission's reasoning that re-initialization back to 1995 would impair the productivity incentives of price caps by creating the perception that the Commission's policies lack constancy and that the price cap carriers' enhanced efficiencies would "come back to haunt them."²²

¹⁷ *See id.* at 529; AT&T PFR at 3-6.

¹⁸ *See* 188 F.3d at 527-528; AT&T PFR at 14.

¹⁹ *Id.* at 528.

²⁰ *See id.* at 529.

²¹ *See id.*; AT&T PFR at 16-19.

²² 188 F.3d at 530. The Court agreed, however, with the local exchange carriers that the Commission could not justify applying the CPD portion of the X-factor back to 1995, since the

In other words, the Court rejected every one of the arguments that were pending in AT&T's petition for reconsideration. It not only rejected arguments for an X-factor higher than 6.5 percent that MCI and AT&T had advocated, but it found that the Commission had not justified raising the X-factor *at all* from the existing levels.

2. CALLS

On remand, the Commission had the task of adopting an X-factor that did not suffer from the flaws of the *1997 Price Cap Review Order*. The Commission issued a notice of proposed rulemaking to determine the X-factor that should be applied both on a prospective and retroactive basis.²³

Prior to that notice, the Coalition for Affordable Local and Long Distance Service ("CALLS"), of which AT&T was a member, submitted a comprehensive proposal to address access charge issues pending in various proceedings, including the *X-Factor Remand Proceeding*. The Commission noted that adoption of this proposal, which included a 6.5 percent X-factor based not on productivity, but on a plan to transition traffic sensitive rates to a target level, would "eliminate the necessity of retrospectively adjusting the X-factor in response to the court's remand."²⁴

CPD was based on the increased incentive for efficiency that would be created by the elimination of sharing, and since that incentive could not have existed prior to elimination of sharing in 1997. *See id.*, 529.

²³ *See Price Cap Performance Review for Local Exchange Carriers, Access Charge Reform*, 14 FCC Rcd 19717, ¶ 2 (1999) ("*X-Factor Remand Proceeding*").

²⁴ *See id.*, ¶ 4. The Court granted a stay of the mandate in that decision until April 1, 2000 to give the Commission time to address the issues. *See id.*, ¶ 1.

In the *CALLS Order*, the Commission adopted the CALLS proposal, and found that it “resolv[ed] major outstanding issues concerning access charges,” including the pending *X-Factor Remand Proceeding*.²⁵ The Commission found that “the controversy regarding the current status of the X-factor and the concurrent uncertainty over the resolution of the controversy disrupts business expectations and future investment decisions of both LECs and new entrants” and that the CALLS proposal resolves the “uncertainty concerning the appropriate level of the X-factor for those price cap LECs that will be regulated under the CALLS Proposal.”²⁶ In particular, the Commission relied on the commitment by the CALLS signatories that adoption of the plan would make changes to the 6.5 percent X-factor unnecessary and that they would not seek to adjust price cap rates billed prior to July 1, 2000.²⁷

On August 5, 2004, the Wireline Competition Bureau issued a Public Notice asking the parties to update the record on the pending petitions for reconsideration of the *1997 Price Cap Review Order*.²⁸ The Bureau noted that the *CALLS Order* may have made the issues in the *1997 Price Cap Review Order* moot or irrelevant, and that it is not clear if there were any remaining issues in dispute. It also noted that the *CALLS Order* resulted from a voluntary industry agreement that may have addressed the concerns raised in the petitions for reconsideration.

²⁵ *CALLS Order*, ¶ 29.

²⁶ *CALLS Order*, ¶ 174.

²⁷ See *CALLS Order*, ¶ 174; Memorandum in Support of the Coalition for Affordable Local and Long Distance Service Plan, CC Docket Nos. 94-1, 96-45, 99-249, 96-262, at n. 79 (filed Aug. 20, 1999).

²⁸ *Parties Asked to Refresh Record Regarding Reconsideration of Price Cap Performance Review for Local Exchange Carriers*, 19 FCC Rcd 51081 (2004).

Only one party – AT&T – filed comments in response to the Public Notice. AT&T argues that the Commission should address its petition for reconsideration if the Commission does not adopt the proposals presented in the *ICF Rulemaking* to govern price cap rates after the CALLS plan expires on July 1, 2005. AT&T argues that if the Commission does not adopt the proposal submitted by the Intercarrier Compensation Forum (“ICF Plan”) on August 16, 2004, it should prescribe an X-factor of over 10 percent and require the price cap carriers to re-initialize their price cap indexes back to 1995 based on the arguments in its petition for reconsideration. AT&T does not explain why its petition for reconsideration was not made moot by the CALLS Order or why its own agreement to the CALLS plan did not constitute a waiver of its right to pursue a higher X-factor for the period covered by the CALLS plan, including the period prior to CALLS.

III. AT&T’s Petition For Reconsideration Is Moot – The *CALLS Order* Resolved The Issues Pending From The *1997 Price Cap Review Order*.

The Bureau is correct that the *CALLS Order* made the issues that had been pending in the *1997 Price Cap Review Order* moot or irrelevant. There is nothing left to be reconsidered with regard to that order. The effectiveness of that order expired when the Commission adopted the CALLS plan effective July 1, 2000. In addition, the *CALLS Order* not only replaced the productivity-based X-factor adopted in the *1997 Price Cap Review Order* with a target-based factor, but it resolved the pending controversy about the level of the X-factor in that proceeding and for the period of time to which that X-factor applied. There is nothing left to be decided on reconsideration.

In the *CALLS Order*, the Commission noted that the X-factor had been the subject of litigation and was being reviewed in the *X-Factor Remand Proceeding*.²⁹ Commenters in that proceeding had proposed X-factors ranging from 3.71 percent to 11.2 percent.³⁰ One of the primary benefits of the CALLS Plan was that it would resolve these controversies and avoid subjecting another productivity-based X-factor to further litigation and court review.

Accordingly, the Commission found that its adoption of CALLS resolved the major outstanding issues in several proceedings, including the *X-Factor Remand Proceeding*.³¹

To make it perfectly clear that the CALLS plan would make the *X-Factor Remand Proceeding* and any other pending proceedings affecting price caps moot, the proponents of the plan made a commitment not to seek recoupment for rates prior to July 1, 2000, including the period covered by the D.C. Circuit's stay of the mandate in *USTA v. FCC*.³² Indeed, AT&T, which advocated an X-factor of 11.1 percent and argued that this X-factor should be applied retroactively to 1995, made it clear that this should be done only if the Commission did *not* adopt CALLS.³³ In its comments on the CALLS plan, AT&T pointed out that one of the benefits of the CALLS plan was that it would eliminate the regulatory uncertainties created by the reversal of the

²⁹ See *CALLS Order*, ¶ 174.

³⁰ See *id.*, ¶ 139.

³¹ See *id.*, ¶ 29.

³² See *id.*, ¶ 174; Modified CALLS Plan, Section 4.3 (filed Mar. 8, 2000).

³³ See *Price Cap Performance Review for Local Exchange Carriers, Access Charge Reform*, CC Docket Nos. 94-1, 96-262, Comments Of AT&T Corp. at 2 (filed Jan. 7, 2000) ("AT&T Jan. 7, 2000 Comments"); Reply Comments at 1 (filed Jan. 24, 2000) ("AT&T Jan. 24, 2000 Replies").

1997 Price Cap Review Order.³⁴ As a signatory to the CALLS plan, AT&T cannot deny that the plan resolved the pending issues in the *1997 Price Cap Review Order*, including the issues that it had raised in its petition for reconsideration.

IV. By Endorsing The CALLS Plan, AT&T Waived Its Right To Seek Revision To The X-Factor In The *1997 Price Cap Review Order*.

The Commission should find that AT&T's participation in CALLS constituted a waiver of its right to seek further reconsideration of the *1997 Price Cap Review Order*. The CALLS proposal was a voluntary agreement among the parties, including interexchange carriers and local exchange carriers, to resolve outstanding issues regarding access charges through consensus rather than continued litigation. The signatories sought to achieve the benefits of the plan by waiving their rights to seek other changes in access charges, both prospectively for the five-year term of the plan and retroactively to 1995.³⁵ The parties agreed that the plan was "a just, reasonable, and fair means of moving usage sensitive interstate access charges to a point achieved by the above mechanism. Therefore, other adjustments, such as changes to the interstate X-factor . . . are unnecessary."³⁶ This constitutes an explicit agreement by the members of CALLS, including AT&T, that the Commission should not change the X-factor for the period covered by the plan.

By joining CALLS, AT&T obtained a commitment by the local exchange carriers to support an upfront reduction of \$2.1 billion in their switched access charges, in addition to nearly

³⁴ See *Price Cap Performance Review for Local Exchange Carriers, Access Charge Reform*, CC Docket Nos. 94-1, 96-262, Comments of AT&T Corp. in Support of the Coalition for Affordable Local and Long Distance Service Proposal, at 19 (filed Nov. 12, 1999).

³⁵ See Modified CALLS Plan, Sections 4.2, 4.3 (filed Mar. 8, 2000)

³⁶ *Id.*, section 4.2.

a 50 percent further reduction over the life of the plan.³⁷ AT&T traded the certainty of these reductions for the uncertainty whether the Commission would be able to achieve similar reductions by adopting an X-factor that would withstand judicial review. Considering that the Court had rejected *all* of AT&T's arguments in support of a higher X-factor, most importantly the cornerstone of AT&T's analysis – the use of interstate-only productivity – it is highly unlikely that the Commission could have crafted a judicially-sustainable increase to the 11.1 percent X-factor that AT&T advocated, or even to increase the X-factor above the 5.3 percent limit. AT&T obtained the benefit of the bargain by joining CALLS and cannot seek additional advantages by asking for further modifications to the price cap regime. As AT&T itself argued, adoption of CALLS or re prescription of the X-factor was an either/or choice – the Commission could not adopt CALLS and still pursue a revised productivity-based X-factor in *X-Factor Remand Proceeding*.³⁸

For these reasons, the Commission should find that AT&T's filings in the *X-Factor Remand Proceeding* and the CALLS proceeding constituted a waiver of its right to pursue re prescription of the productivity-based X-factor in its petition for reconsideration in the *1997 Price Cap Review Order*.

³⁷ See Memorandum In Support of the Revised Plan of the Coalition for Affordable Local and Long Distance Service at 2 (filed Mar. 8, 2000).

³⁸ See AT&T Jan. 7, 2000 Comments at 2; AT&T Jan. 24, 2000 Replies at 1.

V. AT&T's Arguments About The Post-CALLS Environment Are Irrelevant.

To the extent that AT&T's comments address the access charge regime that should exist after CALLS expires, these comments are outside the scope of its petition for reconsideration of the *1997 Price Cap Review Order* and are irrelevant to the issues in that proceeding.

AT&T argues (at 8-10) that, if the Commission does not adopt the ICF Plan, it should rely upon the record in the *X-Factor Remand Proceeding* to prescribe an X-factor of 10.1 percent for the 1997-2000 period and a factor of 9.5 to 9.6 percent for the period after July 1, 2000, plus a 1.0 percent CPD, and apply those factors to reinitialize the price cap indexes on a going forward basis after CALLS expires on June 30, 2005.³⁹ AT&T also argues (at 7, 11-12) that the Commission should push back the re-initialization to the 6.5 percent X-factor to 1995 and use this to revise future rates.

Because this proposed re-initialization would apply to the rates effective *after* July 1, 2005, it has no relevance to the *1997 Price Cap Review Order* or to AT&T's petition for reconsideration of that order. The issue of what comes after CALLS expires is being considered in the *IC Rulemaking*.

AT&T is attempting to use its petition for reconsideration of the *1997 Price Cap Review Order* as a lever to exert pressure in the *ICF Rulemaking* for its ICF Plan. However, the petition

³⁹ Although the Commission adopted CALLS for a five year period beginning on July 1, 2000, the revisions that the Commission adopted to the price cap rules to implement that plan have no expiration date. Therefore, if the Commission does not take action before July 1, 2000, the CALLS rules will continue to apply until modified.

for reconsideration gives it no special status in the *ICF Rulemaking*. The Commission should dismiss AT&T's arguments insofar as it proposes changes to the price cap regime after CALLS.

VI. AT&T Provides No New Data To Justify A Higher X-Factor.

In response to the Bureau's invitation to refresh the record on the issues raised in the petitions for reconsideration, AT&T only submits the same stale information that it filed in the *X-Factor Remand Proceeding*. It re-submitted the comments and reply comments that it filed in that proceeding in January 2000 where it argued for X-factors of 10.1 percent for the 1997-2000 period and about 9.6 percent from 2000 forward. As Verizon demonstrated in its reply comments in that proceeding, AT&T's submissions did nothing to remedy the shortcomings that caused the Court to reject the same X-factor analysis in the *1997 Price Cap Review Order*.⁴⁰

AT&T's filings in the *X-Factor Remand Proceeding* still relied on an interstate-only productivity analysis, regardless of the fact that the Court had specifically rejected the primary assumption of that analysis – that there were equal growth rates for interstate and intrastate cost inputs.⁴¹ The Court found that AT&T “offered no explanation why that assumption was economically justified.”⁴² As Verizon explained, AT&T never solved the problem that there was no way to isolate the true economic costs of inputs on an interstate-only basis.⁴³ It simply used sleight of hand in its *X-Factor Remand Proceeding* comments to assume the problem away. AT&T argued that the interstate inputs in the X-factor equations canceled each other out

⁴⁰ See Bell Atlantic Reply Comments on Further Notice, CC Docket Nos. 94-1, 96-262 (filed Jan. 24, 2000) (attached) (“Bell Atlantic Jan. 24, 2000 Replies”).

⁴¹ See AT&T Jan. 7, 2000 Comments at 9.

⁴² 188 F.3d at 528.

⁴³ See Bell Atlantic Jan. 24, 2000 Replies at 5.

mathematically, allowing a single productivity calculation that does not need to isolate the costs of interstate outputs. But USTA submitted an analysis by Dr. William E. Taylor of NERA showing that AT&T's calculations were premised on the unsupported assumption that revenues and costs for interstate services are equal in every period.⁴⁴ When this assumption is taken out of the equation, AT&T's house of cards comes crashing down.

Even AT&T admitted that its methodology leads to an X-factor based on changes in output, not input.⁴⁵ Or, as Doctor Taylor put it, "AT&T's approach is nothing more than the Historical Price Method which . . . the Commission has already rejected."⁴⁶ In the *1997 Price Cap Review Order*, the Commission stated that;

We also decline to continue using the Historical Price Method developed in the LEC Price Cap Order. None of the commenters supports this approach. Furthermore, the Historical Price Method bases the X-Factor on historical trends in prices of telecommunications prices relative to the economy as a whole, and thus uses price changes as a surrogate for productivity growth. We find that TFP is a more accurate measure of LEC productivity because it is based on incumbent LECs' actual outputs and inputs.⁴⁷

AT&T has never solved the problem of identifying a productivity factor for a subset of services in an industry such as telecommunications where the production process is not separable by service. Since its proposed X-factor relies entirely on its interstate-only analysis, which has no economic basis, it provides nothing that the Commission can use to reconsider the productivity-based X-factor in the *1997 Price Cap Review Order*.

⁴⁴ See Reply Comments of William E. Taylor, Ph.D, on behalf of U.S. Telecom Association, ¶ 4 (filed Jan. 24, 2000) ("Taylor Reply") (attached).

⁴⁵ See AT&T Jan. 7, 2000 Comments at 9.

⁴⁶ See Taylor Reply ¶ 10.

⁴⁷ *1997 Price Cap Review Order*, ¶ 23.

In addition, AT&T's proposed X-factor relies upon a 1.0 percent CPD, based on arguments that productivity will be enhanced due to the shift from rate of return to price caps and the elimination of sharing.⁴⁸ The Court rejected the 0.5 percent CPD in the *1997 Price Cap Review Order*, and AT&T's proposal to double it does not make the case any better.⁴⁹ As Verizon demonstrated in its reply comments, the CPD cannot be justified based on the increased efficiency incentives due to the transition from rate of return to price caps, because all of the data used for the productivity analysis is from the post-price caps period.⁵⁰ And there is no basis for assuming additional productivity due to the elimination of sharing, because most price cap carriers have been out of sharing since 1995, and most states eliminated sharing even earlier.⁵¹

Finally, AT&T's request that the Commission use the revised X-factor to re-initialize the price cap indexes back to 1995, rather than to 1996 as the Commission decided in the *1997 Price Cap Review Order*, was also rejected by the Court in *USTA v. FCC*.⁵² The Court found that "Universal, complete reinitialization would impair the supposed incentive advantages of price caps – which derive from firms' supposing that their efficiencies will *not* come back to haunt them."⁵³ AT&T argues that the Court's decision leaves the Commission with the discretion to go back even earlier, but it provides no reason why doing so will not undermine the efficiency incentives of price cap regulation.

⁴⁸ See AT&T Jan. 7, 2000 Comments at 20-24.

⁴⁹ See 188 F.3d at 527.

⁵⁰ See Bell Atlantic Jan. 24, 2000 Replies at 7-8.

⁵¹ See *id.*

⁵² See 188 F.3d at 530.

⁵³ *Id.*

VII. Conclusion

For the forgoing reasons, the Commission should dismiss AT&T's petition for reconsideration and terminate the *1997 Price Cap Review Proceeding*.

Respectfully submitted,

By:  _____

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Dated: October 1, 2004

THE VERIZON TELEPHONE COMPANIES

The Verizon telephone companies are the local exchange carriers affiliated with Verizon Communications Inc. These are:

Contel of the South, Inc. d/b/a Verizon Mid-States
GTE Southwest Incorporated d/b/a Verizon Southwest
The Micronesian Telecommunications Corporation
Verizon California Inc.
Verizon Delaware Inc.
Verizon Florida Inc.
Verizon Hawaii Inc.
Verizon Maryland Inc.
Verizon New England Inc.
Verizon New Jersey Inc.
Verizon New York Inc.
Verizon North Inc.
Verizon Northwest Inc.
Verizon Pennsylvania Inc.
Verizon South Inc.
Verizon Virginia Inc.
Verizon Washington, DC Inc.
Verizon West Coast Inc.
Verizon West Virginia Inc.

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

In the Matter of)	
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Price Cap Performance Review for Local Exchange Carriers)	CC Docket No. 94-1
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Access Charge Reform)	CC Docket No. 96-262
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BELL ATLANTIC REPLY COMMENTS ON FURTHER NOTICE

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January 24, 2000

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

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BELL ATLANTIC¹ REPLY COMMENTS ON FURTHER NOTICE

I. Introduction and Summary

The record in this docket is clear – the going forward X factor must be lowered to around four percent. On appeal, the productivity model adopted by the Commission in 1997 was upheld. In contrast, the Court rejected the X factor derived by the Commission using that model. It did so, however, not because of defects in the model itself, but because the Court concluded that the Commission had manipulated the results produced by the model in ways that were not justified (or justifiable). On remand, a straight forward run using updated data of the very same productivity model that was developed by the Commission in 1997 and that was upheld on appeal produces an X factor of about four percent.

¹ The Bell Atlantic telephone companies (“Bell Atlantic”) are Bell Atlantic-Delaware, Inc.; Bell Atlantic-Maryland, Inc.; Bell Atlantic-New Jersey, Inc.; Bell Atlantic-Pennsylvania, Inc.; Bell Atlantic-Virginia, Inc.; Bell Atlantic-Washington, D.C., Inc.; Bell Atlantic-West Virginia, Inc.; New York Telephone Company; and New England Telephone and Telegraph Company.

No party disputes these basic facts. Even AT&T agrees that the Commission should not “adopt an entirely new methodology for calculating X-factors.” AT&T Comments at 12. Nevertheless, the long distance incumbents and their allies try to entice the Commission to repeat the same mistakes it made in its prior order by abandoning precedent and ignoring sound economics. By manipulating the productivity results or abandoning them altogether, these parties argue that higher and higher X factors are justified. They are not.

Most of the commenters that argue for higher X factors rely on the alternative methods proposed in the Notice here. But, as Bell Atlantic and USTA demonstrated in their comments, the alternative X factors proposed in the Notice rely on the very same kinds of erroneous manipulations of objective results that were squarely rejected by the D.C. Circuit.

II. The X Factor Should Not Be Manipulated On Account of Changes in Earnings.

Several commenters ignore productivity results and instead rely on the growth in the regulated accounting earnings of the price cap regulated carriers as proof that the X factor should increase. But their claims provide no sound economic basis for an increase to the X factor.

First, the Commission has already rejected reliance on earnings as a basis for setting the price cap X factor because it undermines price cap incentives. If the Commission were to rely on earnings growth as a basis for revision of the X factor, it “would create substantially similar incentives to those under rate of return regulation because the X-Factor would be explicitly linked to earnings.” *Price Cap Performance Review*, 12 FCC Rcd 16642, ¶ 22 (1997) (“1997 Price Cap Order”). As the Commission explained in its brief to the Court of Appeals, “[b]ecause a price cap system stimulates LECs to be efficient through the lure of higher earnings,” any regulatory cap on those earnings “effectively caps the

incentive to be efficient.” *USTA v. FCC*, DC Circuit Case No. 97-1469, Brief For Respondents at 21 (filed June 15, 1998).

Second, it is clear that regulated accounting earnings provide no reliable financial information for use in setting an economically-based X factor. Two recent examples show how malleable – and just how arbitrary and subject to distortion by regulatory decisions – such regulated earnings are.

Bell Atlantic was forced to revise upward its reported interstate earnings when the Commission rejected the assignment to the interstate jurisdiction of intercarrier compensation payments associated with internet-bound traffic. Despite a Commission finding that “ISP-bound traffic is non-local interstate traffic,” the staff required Bell Atlantic to “reclassify, as intrastate, its 1998 reciprocal compensation expenses and revenues that are associated with ISP-bound traffic.” *Compare Inter-Carrier Compensation for ISP-Bound Traffic*, 14 FCC Rcd 3689, ¶ 26, n. 87 (1999) with Letter from Lawrence E. Strickling to Don Evans re Separations Treatment of Internet-Related Reciprocal Compensation, 14 FCC Rcd 13148 (1999). The result significantly increased Bell Atlantic’s reported earnings by adding several hundred million dollars in intrastate costs.

Even more recently, the Commission authorized carriers to modify their depreciation rates under certain circumstances to recognize the fact that regulatory required depreciation rates have been unrealistically low.² *1998 Biennial Regulatory Review – Review of Depreciation Requirements*, CC Dkt. No. 98-137, ¶ 25 (rel. Dec. 30, 1999). The Commission’s willingness to accept financial depreciation for regulatory accounting calls

² In order to obtain such forbearance, however, a carrier must agree to “write-off” the difference between the costs on its regulated books and the costs on its financial books.

into question the overly long depreciation lives (and associated overly low depreciation expense) that account for most of the current difference between regulated earnings and the financial books' GAAP-based earnings.

Third, even if interstate earnings were a legitimate measure here, which they are not, it should not be surprising that average earnings have increased over the period of price cap regulation. As even Ad Hoc concedes, that is the intended result of price cap regulation. See Ad Hoc Comments at 15 (price cap regulated carriers expected to "increase their efficiency and reduce their costs overall"). See also *Bell Atlantic Telephone Companies v. FCC*, 79 F.3d 1195, 1198 (D.C. Cir. 1996) ("Price cap regulation is intended to provide better incentives to the carriers than rate of return regulation, because the carriers have an opportunity to earn greater profits if they succeed in reducing costs and becoming more efficient"). It would be utterly capricious to punish carriers now for meeting the Commission's own goals.

Fourth, despite the long distance carriers' rhetoric, the earnings of the price cap carriers have been below the earnings of other competitive businesses – including the long distance carriers themselves. For example, the interstate return on assets for the former Bell operating companies for 1998 was 15.67 percent. This compares with over 21% for Value Line's group of U.S. industrial companies and roughly 26% for the long distance operations of supposedly competitive AT&T. See Attachment. These lower returns occurred despite the fact that, unlike the price cap regulated carriers, these other companies' returns are based on GAAP accounting without artificial regulatory adjustments that manipulate the earnings upward. With local exchange carriers trailing the earnings of other competitive industrial companies, there is no justification for an earnings-based adjustment to the X factor.

III. Productivity Must Be Calculated on a Total Company Basis.

AT&T argues that, despite the Commission's previous rejection of an interstate only productivity calculation, it has magically solved the underlying problem that there is no way to isolate the true economic costs of inputs on an interstate only basis. According to AT&T, the interstate inputs in the X factor equations cancel each other out, allowing for a simple productivity calculation that does not need to isolate the cost of intrastate inputs. As Dr. Taylor demonstrates, however, AT&T is only able to accomplish this sleight of hand by assuming the problem away. AT&T's entire argument is premised on the unsupported assumption "that revenues and costs for interstate services are equal in every period. There is no basis for such an assumption and without it AT&T's entire house of cards comes crashing down." Reply Comments of William E. Taylor, ¶ 2 (Attachment 1 to USTA Reply Comments).³

In fact, AT&T has tried this trick before, and it was rightly rejected by the Commission. In its 1997 review, the Commission rejected the same argument – then called by AT&T the historical price method. The Commission saw through the AT&T arguments and recognized that "the Historical Price Method bases the X-Factor on historical trends in prices of telecommunications prices relative to the economy as a whole, and thus uses price changes as a surrogate for productivity growth." 1997 Price Cap Order, ¶ 23. Instead, the Commission found that total factor productivity is "a more

³ AT&T's own witness acknowledges (outside of this proceeding) that he is not explicitly measuring productivity. See Taylor Reply Comments ¶ 6 (quoting Stephen Friedlander, "The Use of Productivity Studies in Price Cap Regulation: What do the FCC's X-factor Calculations Really Measure?" 18th Annual Conference of the Center for Research in Regulated Industries, Rutgers University, May 27, 1999) ("The fact that the X-Factor is often called a productivity factor does not make it necessary to measure productivity explicitly").

accurate measure of LEC productivity because it is based on incumbent LECs' actual outputs and inputs.” *Id.* (footnotes omitted). That conclusion was correct in 1997 and it is correct today.

Indeed, not only is AT&T wrong in its argument, its claim is premised on a rate structure that no longer exists. AT&T’s assumption that interstate productivity is higher than intrastate is based on a claim that interstate rates are disproportionately charged on a usage rather than a per-line basis when compared with intrastate rates. As Bell Atlantic demonstrated in its comments, that claim is not true. In fact, as USTA reports in its reply comments, less than 20% of the LEC interstate access revenues are recovered through usage based charges – roughly the same proportion that are recovered through usage based charges for intrastate services.⁴

It is ironic that AT&T tries to use rate of return regulation to push price cap carriers rates down. In another proceeding, AT&T is simultaneously making precisely the opposite argument. There, it is arguing that the Commission should rely on the results of price cap regulation as the best measure of appropriate price changes, and that rate of return regulation (for a carrier in Puerto Rico) results in insufficient rate

⁴ For the same reason, AT&T’s argument supporting a “q” factor adjustment is wrong. AT&T, the only carrier to file comments here in support of a “q” adjustment, claimed that if the Commission continues its policy of reliance on total company productivity results, the “q” adjustment – which purports to adjust rates for demand growth in switching minutes – is necessary because total company results do not adequately reflect the growth in minutes. But total company and interstate results are no different with respect to the proportion of revenues that are based on per-minute charges. Regardless, the X factor “already accounts for all changes in costs and revenues so that a price cap formula that included an adjustment for demand growth would effectively double-count a component of historical productivity gains already reflected in the measure of TFP.” Taylor Affidavit, ¶ 41 (attached to USTA Comments, CC96-262 (filed Oct. 29, 1999)).

reductions. *See Puerto Rico Telephone Company Petition for Waiver*, CCB/CPD No. 99-36, AT&T Opposition to PRTC Waiver Petition at 10 (filed Jan. 11, 2000) (citing to larger GTE price cap reductions in access rates as the appropriate standard to evaluate the smaller rate of return governed access reductions of PRTC).

IV. There is No Justification for a So-Called “CPD”.

There is also no basis to impose a so-called “consumer productivity dividend” (“CPD”). Even GSA concedes that “it may *never* be possible to specify an analytically defensible procedure” to calculate a CPD. GSA Comments at 14 (emphasis added).⁵ AT&T and Ad Hoc claim to offer quantification of a CPD, but their arguments suffer from the same flaws highlighted by the Court.

Like the Commission in the prior order, Ad Hoc and AT&T cite to potential reasons for a CPD – enhanced productivity as a result of the transition from rate of return regulation to price cap regulation, and the elimination of sharing. But neither of the reasons hold water.

Price caps have been in effect for a decade and the one thing almost all parties seem to agree on is that using data from the post price cap era is appropriate to measure going forward productivity.⁶ If all of the data is based on performance under price caps,

⁵ GSA makes this concession despite its relatively low threshold of what may be considered “analytically defensible.” For example, it supports Option 3 from the Notice because that option lowers access charges and “requires only 8 pages” to explain (in comparison to 12 and 36 pages respectively for Options 1 and 2). GSA Comments at 12. GSA is the *only* party that supports Option 3 as the basis for determining the X factor.

⁶ Of course, to the extent the Commission were to revert to some sort of rate of return based regulation (with its reduced efficiency incentives), then any reliance on productivity during the period of price cap regulation would overstate expected future productivity and would have to be reduced.

then there is no basis for an artificial add-on to account for the difference between such performance and the prior regulatory regime.

Similarly, there is no basis to assume additional productivity growth from the transition from sharing. Most price cap carriers have been out of sharing since 1995, allowing much of the data in the model to reflect price caps without sharing. Most states eliminated sharing even earlier.⁷ Affidavit of William E. Taylor, ¶ 56 (Attachment 1 to USTA Comments). As a result, any effort to lard on an assumption of additional productivity growth on top of this data would be double counting. Taylor Reply Comments, ¶ 21.

Because there is no basis for any CPD, the comments that cite to a model for the proposition of quantifying the CPD are irrelevant. Regardless of the impacts of changes in regulation on productivity growth, they are already accounted for. Even if any growth was not already reflected in productivity data (which it is), the models that purport to measure the impact are themselves flawed.

First, the models assume that any increase in incentives translates directly into an identically sized increase in productivity growth. Taylor Reply Comments, ¶¶ 23-27. If desire were the only criteria for success, then every little leaguer would grow up to be a professional athlete. There is simply no basis for the AT&T and Ad Hoc assumption. Indeed, despite the absence of sharing, productivity growth actually decreased in 1996

⁷ Elimination of sharing in state regulation increases incentives as well. Because productivity data must be calculated on a total company basis (which includes state results), that increased incentive impacts the results of the productivity study here.

and 1997. *See* F. Gollop, “Economic Assessment of the 1999 X Factor Model,” Table 6 (Attachment 2 to USTA Comments).

Second, Ad Hoc and AT&T also err in their calculation of increased incentives. With respect to the transition from sharing, they wrongly assume that carriers will always increase their profits and thereby will lose half of their additional profits under sharing. With respect to the transition from rate of return, they assume that any difference in productivity growth between the period just prior to the start of price caps and the period just after is solely due to the change in regulation. This assumes away other changes, including changes in technology, the economy, and consumer demand. All of the assumptions are without basis and are unsupportable. In addition, the measure of productivity growth that they rely on is itself flawed (making the same mistakes proposed in the Notice and refuted in the initial comments).

Third, AT&T also tries to justify a CPD based on differences in X factors for carriers that selected sharing versus those that did not under the 1995 price cap regime. The selection of an X factor under that regime was a one year decision however. As a result, any decision to accept the higher X factor to avoid sharing was a simple analysis of expected regulatory accounting earnings for the following year, and provides no data with respect to the size of the impact from productivity growth as a result of the elimination of sharing.

While none of the arguments to impose a CPD have merit, no party even attempted to justify imposing a CPD on a retroactive basis. As the Court of Appeals explained, the concept of a backward looking incentive makes no sense because “the

companies could not have responded to that incentive before its creation.” *USTA v. FCC*, 188 F.3d 521, 529 (1999).

V. There Are No Other Reasons to Deviate From The Current Productivity Model.

Ad Hoc also resurrects another rejected argument, claiming that the X factor should be increased because the cost of capital inputs are lower than actually reported as a result of enhancements in technology. This so-called hedonic adjustment was already soundly rejected by the Commission. *See* 1997 Price Cap Order, ¶ 67 (“We find nothing in this record to suggest that our TFP calculation would be more accurate with a hedonic adjustment”). There is no reason to reverse that conclusion now.

As Dr. Taylor explains, Ad Hoc’s argument assumes great leaps in technology in recent years, but none in prior years. Taylor Reply Comments, ¶¶ 44-46. Of course, such an assumption is contrary to the history of constant evolution in telecommunications technology. “Whether it is the change from manual to electromechanical switches or the change from mechanical to analog switches, the industry is constantly improving its technology. Therefore, choosing a series at random and modifying only part of the series for unmeasured changes in the quality of output misses the fact that the earlier data that are not modified were themselves representative of superior technology *vis-à-vis* earlier periods.” *Id.*

Regardless, any increased productivity as a result of new technology is already captured in the productivity model. The benefit to the carriers from technology advances in their inputs is greater output at reduced cost. But output is already measured under the model so there is no “effect” left to capture, and any add-on to the productivity offset would be arbitrary double counting. Taylor Reply Comments, ¶ 46.

Finally, several smaller price cap carriers argue for a separate lower X factor. They offer outdated studies of past differences that provide no real empirical basis for such a claim going forward. While there are differences among all carriers, there is no reason to isolate size and then assume that the X factor is automatically lower for the smaller carrier.⁸ Because the X factor purports to be a measure of changes in productivity and not absolute levels, there is no reason to assume that going forward productivity changes by smaller carriers will not exceed those of the larger carriers.

**VI. Carriers Must Be Allowed To Recoup Amounts Wrongfully
Removed From Rates.**

The Commission also has an obligation to determine what the X factor should have been during the period between its 1997 order and its going forward determination. That decision must be based on the record before the Commission at the time of the original order. *See* 47 U.S.C. § 402(b). As a result, the Commission must allow the local exchange carriers to recoup the difference between what the X factor should have been under the Commission's model at that time and the inflated 6.5 X factor.

No party disputed the Commission's obligation to make such allowance if the prior X factor was overstated.

⁸ For example, some smaller carriers are primarily rural while others have significant urban centers and have proportionally less rural areas than many of the large carriers. Moreover, to the extent that smaller carriers have not yet installed productivity enhancing switching equipment that is in use by Bell Atlantic and other large carriers, these smaller carriers have the potential for greater productivity gains going forward as they adopt such technology.

Conclusion

If the Commission does not accept the CALLS proposal, it should adopt an X factor of no more than four percent, and adjust local exchange carrier rates upward to reflect the period when an unlawful 6.5 percent X factor was in place.

Respectfully submitted,

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January 24, 2000

PRICE CAP COMPANIES' INTERSTATE EARNINGS ARE
LESS THAN AT&T'S OR OTHER
INDUSTRIAL COMPANIES'

Rate of Return ¹	1998	1997	1996
BOCs – Interstate	15.7%	14.8%	14.6%
AT&T Long Distance ²	32.5%	26.2%	30.1%
Value Line US Industrials	21.5%	23.8%	22.3%

¹ Net Operating Income/Average Assets. Net Operating income = earnings before interest and taxes less estimated taxes (EBIT – Taxes).

² Sum of business and consumer lines of business as reported by AT&T in its 1998 annual report. 1996 uses year-end assets in lieu of average assets (where was unavailable). This likely understates actual 1996 return.

**BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION**

IN THE MATTER OF

**PRICE CAP PERFORMANCE REVIEW
FOR LOCAL EXCHANGE CARRIERS**

ACCESS CHARGE REFORM

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CC DOCKET NO. 94-1

CC DOCKET NO. 96-26

**REPLY COMMENTS OF
WILLIAM E. TAYLOR, Ph.D.**

**ON BEHALF OF
UNITED STATES TELECOM ASSOCIATION**

JANUARY 24, 2000

**REPLY COMMENTS OF
WILLIAM E. TAYLOR, Ph.D.**

CC DOCKET NO. 94-1 & 96-262

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**REPLY COMMENTS OF WILLIAM E. TAYLOR, PH.D.
JANUARY 24, 2000**

I. INTRODUCTION

1. My name is William E. Taylor. I am a Senior Vice President of National Economic Research Associates, Inc. (NERA), head of its telecommunications economics practice and head of its Cambridge office. I filed direct comments in this Docket on behalf of the United States Telecom Association (“USTA”) on January 7, 2000 and have been asked to reply to some of the economic issues raised by other parties. In particular, two major claims that I address are the assertions:

- that an interstate-only TFP methodology can be developed in an economically meaningful and defensible manner, and
- that a study by Strategic Policy Research (“SPR”) can be used to develop a measure for the impact that eliminating earnings sharing will have on price-cap LEC productivity.

2. On the contrary, after more than ten years of price cap analysis, debate and decision making, there is one fact that should be clear to all parties by now: there is no economically meaningful definition of an interstate-only X-factor and therefore there is no defensible methodology to estimate it. AT&T’s proposal is simply a regurgitation of the Historical Price Method, and it works no better the second time around. Try as it might, AT&T will never be able to produce an economically respectable productivity study for a subset of services in an industry like telecommunications where the production process is not separable by service. AT&T’s attempt here relies on the trick of assuming that revenues and costs for interstate services are equal in every period. There is no basis for such an assumption, and without it AT&T’s entire house of cards come crashing down. As I demonstrate below and in the Appendix, AT&T’s effort was doomed from the start because there is no interstate X-factor to measure.

3. In addition, AT&T and Ad Hoc present several flawed methods that attempt to estimate the effect that the elimination of earnings sharing has on price cap LEC productivity. Their conclusions are incorrect because (i) they are based on the unsupported and erroneous assumption that changes in efficiency incentives give rise to proportional changes in measured productivity growth and (ii) they are based on flawed measures of productivity growth in the post price cap period.
4. Finally, I address several additional topics: Ad Hoc's cost of capital sensitivity analysis, its use of minutes as a measure of local output and its Hedonic adjustment argument and AT&T's 1997 reinitialization recommendation to the Staff Imputed X-Study.
5. Apart from the economic errors made by the parties in this proceeding (in methodology and practice), the implicit motivation for the proposed changes (as well as the proposed changes raised in the Commission's recent Access Reform Further Notice of Proposed Rulemaking) is flawed—namely the notion that the price cap LECs' earnings have been "excessive." I have consistently pointed out the flaws that underlie the calculation of interstate earnings. However, as discussed in the Reply Comments of USTA, even the flawed interstate earnings which are cited by the parties do not support the proposition that the price-cap LECs' earnings are excessive.¹ Specifically, USTA concludes that the BOC industry average after-tax interstate profit margin has remained at or slightly below the ROR era levels through 1998. The USTA analysis shows that increases in earnings per dollar of investment are associated with higher levels of revenue per dollar of investment and constant earnings per dollar of revenue. LEC efficiency has increased, not their profit margin. And, rate reductions under price caps have exceeded \$6 billion. This combination vindicates the Commission's price cap plan and is a sign of success, not failure. As the Commission stated in the *1997 Price Cap Performance Review* (at 2):

Price cap regulation is intended to encourage growth in productivity by permitting incumbent LECs that increase their productivity to earn higher

¹ I made a similar point in the recent Access Reform Notice of Proposed Rulemaking, where I stated that earnings of price cap LECs have not performed as well as the average industrial firm while—at the same time—the LECs' customers have done considerably better than average customers as a result of price cap regulation. See Comments of William E. Taylor, October 29, 1999, CC Docket 96-262.

profits, while at the same time ensuring that interstate access customers share in the benefits of productivity growth in the form of lower rates. The price cap formula was designed to ensure that “[b]oth carriers and customers will be better off” under price cap regulation.

Clearly, the Commission’s objectives are being met. Price cap customers are better off while increases in LEC earnings are due to more efficient use of resources.

II. AT&T’S INTERSTATE-ONLY TFP METHODOLOGY DOES NOT ADD UP

6. AT&T presents a study that purports to find the elusive solution that has been evading the Commission since the beginning of price cap regulation: an economically defensible measure of the growth of productivity for the interstate services of a local exchange carrier.² But like a wolf in sheep’s clothing, AT&T’s methodology is not what it appears to be. Had AT&T remembered the economic arguments developed in the beginning of price cap regulation, it would have recalled that this approach has already been raised, refuted and rejected because it embodies two incorrect assumptions: (i) that interstate total factor productivity growth is defined and (ii) that interstate revenues and costs can be meaningfully measured.
7. The method used by AT&T in its Appendix A is, as its author states, based on a paper presented at a recent economics conference.³ In the paper, however, the author is more candid about his proposed X-factor and LEC productivity growth:

Finally, it is worth reiterating that there is no need to explicitly estimate productivity growth to determine the X-Factor...The fact that the X-Factor is often called a productivity factor does not make it necessary to measure productivity explicitly.⁴

² AT&T Comments Appendix A, “Direct Calculation of Interstate-Only X-Factors Based on Option 2 Methodology,” Stephen Friedlander.

³ Stephen Friedlander, “The Use of Productivity Studies in Price Cap Regulation: What do the FCC’s X-factor Calculations Really Measure?” 18th Annual Conference of the Center for Research in Regulated Industries, Rutgers University, May 27, 1999, (“Friedlander Rutgers paper”).

⁴ *Ibid*, at 13.

AT&T's study does not result in a measure of productivity growth at all. Yet AT&T's Comments are cast as having finally found what the Commission has been searching for all along—an economically defensible measure of interstate-only productivity.⁵ Nothing is further from the case.

8. AT&T's study simply rediscovers the so-called "indirect" method for estimating TFP growth which was known as the Historical Price Method in FCC price cap terminology. This method uses the economic duality between prices and quantities to measure productivity growth as the difference between changes in input and output prices rather than the difference between changes in output and input quantities. AT&T's Appendix A begins with the observation that the economically justified X-factor is derived by summing the difference between US and LEC TFP growth and US and LEC input price growth. After several calculations, AT&T arrives at the following expression for X:⁶

$$(1) \quad X = \% \Delta Q_{lec} - \% \Delta REV_{lec} - \% \Delta TFP_{US} + \% \Delta IP_{US}$$

The first two terms are equivalent to a LEC-specific output price index while the last two terms are equal to national inflation (GDPPI), as recognized in Appendix A. As I show in Appendix I, this expression is nothing more than the indirect method for calculating the X-factor. Up to this point, AT&T's intuition is correct. Its mistake, however, occurs when it assumes that it can apply equation (1) above to the LECs' interstate-only output and revenue to get an economically valid measure of interstate-only TFP growth. This assumption is economically incorrect and simply cannot be done.

9. Productivity growth can be calculated from either the differential rates of growth of input and output quantities or prices.⁷ However, measurements of the change in TFP by either

⁵ "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...As a matter of both law and policy, the X-factor should be based, if possible, on estimates of productivity gains for interstate services." [AT&T Comments at 8].

⁶ AT&T Comments, Appendix A, equation (7).

⁷ D. W. Jorgenson observes that: "An index of total factor productivity may be computed either from quantity indexes of total output and total input or from the corresponding price indexes." D. W. Jorgenson, "The Embodiment Hypothesis," *Journal of Political Economy*, Vol. LXXIV, February 1966.

the price or quantity method requires the assumption that the value of the firm's input equal the value of the firm's output in each period—or at least that the data are adjusted so that this identity holds approximately in the historical period. These basic facts from the economic theory of duality imply that the apparent ability of the historical price method to produce a productivity offset or a measure of productivity growth *for an individual service* or for interstate services is illusory. When output price data for interstate services are adjusted to keep earnings constant across the historical period, accounting costs and revenues must be assigned to individual services—and therein lies AT&T's fundamental economic error. AT&T attempts to mask this crucial fact by simply stating (Appendix A at 6), almost as an afterthought that:

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 [emphasis added].

AT&T cannot get around the fact that costs and revenues must be jurisdictionally separated in order to arrive at its results. As the author of Appendix A acknowledges:

Once it is recognized that the X-Factor is determined on the basis of growth in revenue per unit, and not growth in total factor productivity, the LEC argument is rendered moot. There is no reason why the FCC can not focus on the trend in interstate revenue (*or costs allocated to interstate via the separations process*) per unit of output, as it did when previously prescribing X-Factors via the *Historical Price Method*. [emphasis added, footnotes omitted].⁸

10. No reason, indeed. AT&T's flawed logic is: if you can't measure interstate TFP growth, base X on the trend in costs allocated to interstate via the separations process. The AT&T approach is nothing more than the Historical Price Method which, as described below, the Commission has already rejected. It is not what AT&T claims in its comments (at 8)—an X-factor based on productivity gains in interstate services. AT&T cannot escape the fundamental economic problem that what makes an interstate-only productivity calculation impossible is that the production function is not separable. In the presence of shared fixed and common costs, one cannot assign costs and revenues to the interstate and intrastate

⁸ Friedlander Rutgers paper at 12.

jurisdiction in any economically meaningful way so that equations (7) or (9) provide a valid measure of X based on interstate-only productivity growth. Using the Historical Price Method to estimate productivity for specific services erroneously assigns a portion of the LECs' fixed costs to interstate services and derives an arbitrary estimate of interstate TFP growth.

11. Moreover, in contrast to AT&T's claim (at 2), the problem is **not** simply one of "separating interstate and intrastate costs for the TFP calculations." The problem is that TFP growth for interstate services **is not defined** for a multiproduct firm whose production function is not separable. What this phrase means is that changes in unit costs of interstate access services—which in competitive markets would drive changes in prices which the price cap plan attempts to emulate—depend on changes in both interstate and intrastate demand quantities, interstate and intrastate variable costs and the shared fixed and common costs that cannot be assigned. Absent separability of the production function, suppose there were no shared fixed and common costs—so that all costs could be (meaningfully) jurisdictionally assigned—and suppose further that output quantities could be unambiguously separated between interstate and intrastate services. As I described in my previous comments in this docket, even in this best case, there would still be no TFP growth defined for interstate services. The change in unit cost of an interstate minute would depend on the growth of interstate as well as intrastate minutes of use. Thus, in a competitive market, we would not expect the price of an intrastate minute to fall more slowly than the price of an interstate minute simply because intrastate output growth was slower than interstate output growth. In the simple case where unit costs fall with the growth of minutes (irrespective of jurisdiction), we cannot use the difference in growth rates of interstate output and input to tell us anything about what would happen to interstate unit costs or interstate prices.
12. What AT&T purports to measure doesn't exist. However, as one might examine a purported photograph of an alien space ship and wonder what it was, one might well ask how AT&T has managed to measure a non-existent interstate X without jurisdictionally

separating revenues and costs.⁹ As shown below in Appendix I, the mathematical sleight of hand is perpetrated in an underlying assumption of the model: that revenues and costs for interstate services are equal in every period. Only under the assumption that interstate revenues and costs are well-defined and equal has AT&T managed to find this black cat in the dark room in which there is no cat.

13. In Appendix I, I derive the indirect method of calculating the change in TFP and the resulting X-factor for the regulated firm. Two results stand out. The first is that the end result is, in essence, the same as AT&T's equation (1) in Appendix A. The second, and more important result is that the underlying assumption that is needed in order for the identity to hold is that the *total company's* revenue just recover its costs so that there is zero economic profit. Applying the method in Appendix I to a subset of services or an individual service is incorrect if the production function is not separable in those services. There is no escaping the fact that the indirect approach must be undertaken at the level of the total firm rather than for interstate or individual services.

14. Moreover, AT&T's method (which is nothing more than the indirect method) relies on the premise that the trend in revenue per unit of measured output is an accurate measure of the trend in unit costs. However, in the previously cited paper, the author casts doubt on this important assumption. After identifying certain concerns with the output index used by the Commission (and on which the author relies) he states:

These considerations suggest that the trend in revenue per unit of measured output can *deviate substantially* from the trend in unit costs.¹⁰ [emphasis added]

AT&T's proposal to base X on the change in unit revenues makes no sense if the change in unit revenues differs from the change in unit costs.

15. Apart from the economic error of attempting to use the indirect method to estimate an interstate-only X-factor, there is another general weakness with the indirect method. While in theory, duality implies that TFP growth measured by quantities and prices will be the

⁹ It has escaped no one's notice that these productivity debates are collectively classified as "X Files" in the industry.

same, violating any of the assumptions of the methods will not likely have the same effect on the two TFP growth measures. For example, TFP growth measured by quantities could differ markedly from TFP growth measured by prices if economic earnings vary from year to year during the historical period. If prices are adjusted in each period to keep measured economic earnings constant, errors in the adjustment would affect TFP as measured by prices more than TFP as measured by quantities. Using the historical price method, TFP growth is calculated from changes in prices (i.e., the difference between the rates of growth of input and output prices). Using the quantity method, prices enter TFP growth calculation only as part of the revenue and expenditure weights used to calculate aggregate quantity indices of outputs and inputs and enter the calculation only as levels rather than annual changes. Thus, errors in measuring input or output prices (or adjusting prices to keep accounting earnings constant) have a larger effect on TFP growth as measured by price rather than quantity.

16. Indeed, possibly for this reason the Commission has already rejected the Historical Price Method in the *1997 Price Cap Performance Review* (§ 23):

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

17. Finally, even ignoring AT&T's adjustments to historical revenues, the use of annual growth rates in revenues and output as an LEC output price index produces results that are inconsistent with the very design of price caps. When LECs are pricing at the cap, the difference between the change in its average prices as measured by the price cap mechanism and GDP-PI equals X. Therefore, apart from exogenous changes, historical observations of LEC output prices as determined by AT&T's methodology should closely reproduce the X factors that were in place during that period.

¹⁰ Friedlander Rutgers paper at 12.

18. In fact, the method described in AT&T's Appendix A—equation 9 applied with actual, rather than adjusted revenue—produces values for what should be the mathematical equivalent of X that are considerably larger than the productivity targets that were in place. Table 1 shows these results (for both adjusted and unadjusted revenue). For example, in 1993, AT&T's approach (using actual rather than adjusted revenues) suggests that LECs reduced their interstate prices by about inflation less 9.8 percent, even though the X factor was only 3.3 percent or 4.3 percent during that period. Clearly, the price change predicted using AT&T's methodology is different from the price change that occurred using the X-factor measure in place at the time.
19. How can this be? The answer must be that the price index used in the price cap mechanism must be fundamentally different than the price index implied by AT&T's approach. Thus, because the two indices obviously measure different things,¹¹ rates of change from one index tell you nothing about how the other index should change. This “apples and oranges” difference in output price indices completely invalidates AT&T's method, even before the erroneous rate-of-return adjustments to revenues are performed.

Table 1: “Historical X” Using AT&T's method¹²

Year	Historical X using Adjusted Revenue (%)	Historical X using Unadjusted Revenue (%)	X-Factor(s) (%)
1986	.01	.01	
1987	11.33	11.33	
1988	12.65	12.65	
1989	10.41	10.41	
1990	20.31	17.06	
1991	12.23	13.38	3.3 – 4.3
1992	10.00	6.77	3.3 – 4.3
1993	12.17	9.82	3.3 – 4.3
1994	6.51	6.26	3.3 – 4.3

¹¹ For example, AT&T's index most likely captures both price changes and shifts in demand to alternatives with lower unit price. Consider the special access component to interstate output and revenue. AT&T's approach implies an over 10-fold reduction in the price per special access line from 1985 to 1998. This was undoubtedly a combination of some price reductions in special access rate elements and shifts to higher capacity facilities, which have lower per-line rates.

¹² The data in the table are generated by applying equation 9 in AT&T's Appendix A. Data for interstate revenue come from AT&T Appendix A-2 and data for interstate output come from 1999 Staff study Table B-4.

1995	9.12	8.62	4.0 – 5.3
1996	9.07	7.11	4.0 – 5.3
1997	10.22	9.46	6.5
1998	2.57	2.44	6.5

III. AT&T AND AD HOC'S ARGUMENTS REGARDING THE CPD ARE FLAWED

20. In the *1997 Price Cap Performance Review*, the Commission decided to retain a CPD of 0.5 percent in the X factor to offset productivity growth stemming from the elimination of sharing requirements. In remanding this issue to the Commission, the Court questioned the Commission's justification for the CPD, citing the Commission's failure to tie the CPD to a specific productivity increase that could reasonably be expected from the elimination of sharing.
21. In my initial comments [at 27] I argued that while it is certainly plausible that the elimination of the sharing requirement from a price cap plan might—all else equal—lead to an increase in a firm's efficiency incentives, as a factual matter consumers have already partly benefited from the increased efficiency resulting from the elimination of the sharing requirements.¹³ Continuing to include a CPD would effectively double-count the benefits of the elimination of sharing and, as a result, defeat the original purpose for eliminating sharing in the first place. Therefore, regardless of the CPD estimates provided by Ad Hoc, AT&T or any party, the effect that eliminating sharing has on productivity is to some extent already being incorporated in the Commission's current X-factor and even more so if the Commission revises the X-factor by using data up to 1998.
22. However, even if AT&T and Ad Hoc have a basis to claim (which they do not) that the sharing impact is not already partly taken into account, they both propose flawed methods to estimate the effect that the elimination of earnings sharing has on price cap LEC

¹³ As described in my initial comments [at 28], in the original 1990 LEC Price Cap Order the Commission provided various options for price cap LECs to choose higher X-factors in return for less stringent earnings requirements. In 1995 the Commission permitted the price cap LECs to choose an option that provided for no earnings sharing and the vast majority of price cap LECs selected this option. Ultimately in 1997, the Commission eliminated sharing altogether. As a result, the price cap LECs have experienced at least some of the incentives benefits from elimination or reduction of sharing since as early as 1991.

productivity.¹⁴ The methodology that AT&T and Ad Hoc highlight and primarily rely upon is based on a study by SPR on behalf of Southwestern Bell in the 1994 Price Cap Performance Review.¹⁵ The SPR study developed a method for measuring the efficiency incentives embodied in price-cap plans of various durations. From the SPR study, AT&T and Ad Hoc derive different estimates of the degree to which changes in incentives arising from the elimination of earnings sharing are greater than changes in incentives arising from the movement from rate of return (“ROR”) regulation to price cap regulation with earnings sharing. There are three major problems with the conclusions that AT&T and Ad Hoc derive from the SPR study. First, as I describe below in detail, AT&T and Ad Hoc misinterpret the SPR study by equating changes in incentives to changes in productivity growth. While changes in incentives can lead to changes in productivity growth, there is no evidence—in the SPR Study or elsewhere—that a 10 percent increase in incentives leads to a 10 percent increase in productivity growth. Second, the SPR study overestimates the efficiency incentives under ROR regulation thereby underestimating the change in incentives from adopting price cap with sharing. Third, the SPR study likely underestimates the efficiency incentives under a 50/50 sharing plan, thus further underestimating the change from adopting price cap with sharing. These errors lead to incorrect estimates of the impact of eliminating sharing on productivity. And when combined with flawed measures of the productivity impact resulting from eliminating ROR regulation, their conclusions become economically meaningless.

A. Changes in incentives do not equate to changes in productivity growth.

23. The fundamental mistake made by AT&T and Ad Hoc is that they equate changes in price cap LEC efficiency *incentives* estimated in the SPR study to changes in price cap LEC *productivity*.¹⁶ Logically, this does not follow nor does it follow as a matter of economic theory.

¹⁴ See AT&T Comments Appendix C and Ad Hoc Comments pp 18-29.

¹⁵ See Attachment to Comments of Southwestern Bell Telephone Company, CC Docket 94-1, May 1994.

¹⁶ AT&T makes this assumption explicitly: “If we further assume that the LEC’s potential productivity gain, X, is a linear function of the incentive for efficiency, I, ...” [Appendix C at 2].

24. The SPR study develops a methodology for measuring the efficiency *incentives* embodied in price-cap plans of various duration, which it defines as the net present value to the regulated firm of an investment that increases annual profits by \$1. As discussed below, AT&T and Ad Hoc use the SPR study to derive different estimates of the degree to which changes in incentives arising from the elimination of earnings sharing are greater than changes in incentives arising from the movement from rate of return (“ROR”) regulation to price cap regulation with earnings sharing. AT&T predicts that the change in incentives is 3 times as great while Ad Hoc predicts it is approximately 4.25 times as great. They then incredibly assert that the change in productivity growth will be 3 times (AT&T) or 4.25 times (Ad Hoc) as great because of a change to pure price cap regulation compared with a change to price cap regulation with sharing.
25. Assume for the moment that SPR’s methodology is for the most part correct and properly applied by AT&T and Ad Hoc.¹⁷ AT&T and Ad Hoc’s appalling error is their assumption that changes in efficiency incentives equate to proportional changes in measured productivity growth.
26. Productivity growth is driven by many factors not just changes in incentives. These factors include changes in consumer demand growth, consumer income, tastes and preferences, changes in market conditions in the factor markets and changes in technology. While the desire or incentive to increase productivity growth certainly has a positive impact on the productivity growth achieved, other factors surely influence these gains. And even if these factors could be held constant, there is no reason to think that doubling the incentive to make profits will double the growth of total factor productivity.
27. A change in incentives facing an economic agent does not necessarily equate to a proportional change in the behavior that the incentive is intended to influence. For example:

¹⁷ Below, I describe several problems with AT&T’s and Ad Hoc’s use of the SPR Study results which bias upward their derived estimates of the CPD.

- Some presidential hopeful in New Hampshire promises to cut the marginal income tax rate in half. Should he be elected and keep that promise, we will all have an incentive to work more hours. But not necessarily twice as many or even 20 percent as many.¹⁸
- If Massachusetts doubled the fine for speeding, would the number of cars speeding fall in half? Would people drive half as fast?
- A mutual fund manager's compensation might be proportional to the amount by which she beats the S&P 500. Doubling the amount she keeps for each point above the S&P 500 would encourage her to work more hours, pick better stocks and increase the returns for her fund, but none of those measures of success would necessarily double in response to the change in incentives.
- A running back in professional football gained 1000 yards last year and received a bonus of \$1000 per yard. If his bonus were increased to \$4000 per yard this season, his incentive would increase by a factor of 4, but we would not necessarily expect him to run for 4000 yards.

For these reasons, AT&T and Ad Hoc's estimates of the CPD based on the SPR Study are nonsense. With no evidence and no support from the SPR Study, they equate changes in incentives with proportional changes in the outcome that those incentives are attempting to influence, which in this case is productivity growth for price cap LECs. An increase in incentives will increase average productivity growth—all else equal—but there is no evidence in the SPR Study that even attempts to link the change in incentives with a corresponding change in TFP growth for the regulated firm.

B. AT&T and Ad Hoc misuse the relative efficiency gains from eliminating sharing reported in the SPR Study.

28. AT&T uses SPR's efficiency estimates to arrive at the conclusion that the change from a price cap system with sharing to one without sharing should ultimately produce a larger productivity increases (about three times) than the productivity change from the old ROR system to price caps with sharing. Ad Hoc, using a slightly different approach, arrives at 4.25 as the appropriate number. Both of their results are driven by the observation that the

¹⁸ If the current marginal tax rate of 30 percent were cut to 15 percent, an individual would keep 85 rather than 70 cents of a marginal dollar of income. In the language of the SPR study, this change would amount to a 20 percent increase in incentives, but there is no reason to believe taxpayers would work 20 percent more hours.

SPR study predicts that the efficiency incentives under ROR regulation with a one year lag are about 14 percent of the efficiency incentives that exist in unregulated competitive markets. The SPR study predicts that the efficiency incentives under a four year price cap regulation plan with 50/50 sharing are about 18 percent of the efficiency incentives that exist in unregulated competitive markets. Finally, the SPR study predicts that the efficiency incentives under a four year pure price cap plan are about 35 percent of the efficiency incentives that exist in unregulated competitive markets. Table 2 below restates these conclusions of the SPR Study.

Table 2: Efficiency Incentives Relative to Unregulated Market (%)

Term of Plan (Years)	Hybrid Price Cap With a 50/50 Sharing	Pure Price Caps	Rate of Return 1 Year Lag
1	8	14	14
2	11	21	14
3	15	29	14
4	18	35	14
5	22	42	14
6	25	49	14
7	29	55	14
8	32	62	14
9	35	67	14
10	37	71	14

Source: SPR study (pp. 21-23)

29. Several characteristics of the SPR model are evident in Table 2. First, the relative efficiency incentives under pure price caps are generally about double those under price cap regulation with 50/50 sharing. This relationship makes intuitive sense because for every dollar given back under a 50/50 sharing plan the firm would get to keep approximately two dollars under a pure price cap plan. Second, the efficiency incentives for 50/50 sharing relative to rate of return regulation are quite low for plans of short duration because—under rate of return regulation in the SPR Study—the firm never gives back earnings retrospectively, and that effect dominates for sharing plans of short duration. Third, the relative efficiency incentive of rate of return regulation (with a one year lag) is simply given by the relative efficiency incentive of a one-year pure price cap plan.

30. A serious problem with the use AT&T and Ad Hoc make of the SPR Study is that the reduction in efficiency incentives—for price cap purposes—from adopting a regulatory plan with sharing is greatly overstated in the Table 2. For its purposes, SPR models efficiency incentives as a function solely of efficiency gains. That is, price caps without sharing has roughly twice the efficiency incentives as price caps with 50/50 sharing because—for firms in the sharing range—a firm without sharing will keep roughly twice the incremental profit from a successful investment than a firm under price cap regulation with 50/50 sharing. In the current application to productivity growth, however, this model is inadequate: the consequences of potential losses—which are ignored in the SPR Study—are equally as important as the consequences of potential gains.
31. Suppose the firm is regulated by a 50/50 sharing plan and expects to be in the sharing range. Under these circumstances, its potential payoff if an investment is successful is half that of a firm under pure price cap regulation but so is its expected loss if the investment proves to be unsuccessful. Under 50/50 sharing, both incremental gains and losses are received and paid for in 50-cent dollars. Thus, the net effect of these changes in incentives on the amount of investment is ambiguous. For example, suppose a firm in the sharing range were contemplating an investment that would return \$10 of incremental profit if successful and \$10 of incremental loss if unsuccessful. If success and failure were equally likely, the expected gain to the firm from the investment would be exactly the same under 50/50 sharing and pure price cap regulation. In contrast, the SPR model would show twice the incentive to invest under pure price cap regulation compared with 50/50 sharing.
32. In addition, the SPR Study may overestimate the efficiency impact in practice of ROR with a one year lag. The SPR Study assumes that under ROR, a firm can earn above its required return and keep it all in subsequent periods. In the next rate case, prices would be adjusted so that in the *subsequent* period, the regulated firm would earn a competitive return with no adjustment for its overearnings in the prior period. Price cap regulation with sharing, on the hand, would require the firm to return 50 percent of the gains achieved within the sharing range and so, for very short plans, the efficiency incentives under price cap regulation with sharing would actually be lower than under ROR regulation. In the real world, application

of these types of regulation would not give rise to these strict differences. The effect of this problem in the application of the SPR Study would decrease AT&T's and Ad Hoc's estimates of the amount by which moving to a pure price cap system would result in increased incentives compared with a move to price cap regulation with sharing.

33. For example, assuming only a 10 percent overestimate of the efficiency incentives under ROR regulation would change AT&T's estimate from 3 (times the amount) to only 2.2 and Ad Hoc's estimate changes from 4.25 (times the amount) to only 3.1. Finally, when both the underestimation of price cap plans with sharing and the overestimation of ROR are modified by assuming a 10% error in both instances, it changes AT&T's estimate from 3 (times the amount) to only 1.3 and Ad Hoc's estimates change from 4.25 (times the amount) to only 2.1. Clearly, AT&T and Ad Hoc's estimates are not particularly robust and are sensitive to slight changes in value.¹⁹

C. AT&T and Ad Hoc overstate the CPD by using flawed measures of the productivity impact resulting from eliminating ROR regulation

34. The next step in AT&T and Ad Hoc's method is to estimate the amount by which productivity growth has changed after the movement from ROR regulation to price cap regulation with sharing. This amount is then multiplied by the degree to which incentives are greater from eliminating sharing than eliminating ROR regulation. Both AT&T and Ad Hoc use flawed measures of the productivity impact resulting from eliminating ROR regulation. Their general approach is to compare TFP growth during the 1986-1990 time period to TFP growth during the 1991-1995 or 1991-1998 time period. Ad Hoc and AT&T both use the Staff's 1999 TFP methodology with slight modifications. AT&T also uses their own interstate TFP study as well as the Staff's imputed X study.
35. The first problem with their methodology is that they fail to isolate the impact that eliminating ROR regulation has on price cap LEC productivity growth. Both AT&T and Ad Hoc use time series data from 1986 to 1995 or 1998 and take a simple difference in the

¹⁹ For example, when both the underestimation of price cap plans with sharing and the overestimation of ROR are modified by assuming a 15% error in both instances, it changes AT&T's estimate from 3 (times the amount) to only .93 and Ad Hoc's estimates change from 4.25 (times the amount) to only 1.6.

average growth rates between 1986-1990 and 1991-1995/1998. Incredibly, they use this difference as the degree to which LEC productivity changed as a result of the elimination of ROR regulation. The difference in the averages can be explained by many factors and it is simply incorrect to ascribe these differences entirely to the elimination of ROR regulation. Productivity growth is a function of many additional factors such as utilization of labor, capital and material, changing market conditions including prices, customer taste and preferences, and income, and changes in technology. AT&T and Ad Hoc incorrectly give all the credit for changes in productivity during this time period to the change in regulation and this is simply incorrect. In the early years after divestiture, output growth resulting from increased subscriber line charges, lower carrier access and lower long distance prices probably caused significant one-time increases in TFP. By itself, the fact that subscriber line charges did not continue to rise in the 1990s resulted in slower TFP growth despite the change in regulation from rate of return to price caps in 1990. Similarly, since the implementation of the 1996 Telecommunications Act, the introduction of competition may have reduced LEC productivity growth, as output has grown less rapidly than without competition. Moreover, ILECs have been required to invest large amounts of money in market opening activities which may have the effect of increasing input quantities without a corresponding increase in output quantities.

36. In addition, AT&T and Ad Hoc use flawed measures of the degree to which LECs have increased productivity growth in the post-ROR era. AT&T uses its interstate-only productivity study and relies as well on the Staff's imputed X study. But for reasons mentioned above and in my Direct Comments, these methods are flawed and do not provide good measures of TFP changes. Even the measures used by AT&T and Ad Hoc do not show a statistically significant change in either the X-factor or the LEC TFP growth during the time periods of interest. Ad Hoc's X-factor series (Attachment 3) fails a difference of means test at the 5% level for the periods 1986-1990 and 1991-1995/8. AT&T's X-factor measures (Table A-4, A-6) and its measure of LEC TFP growth (Table A-8) also fail difference in means tests at the 5% level during the same periods.

37. In fact, a corrected data series supports results that are diametrically opposed to the proposition by AT&T and Ad Hoc. Specifically, USTA has attached a study by Professor Frank Gollop showing a decline in the X-factor during the post price cap period. The Commission's original 1997 TFP study also showed a decline, albeit slightly. Table 3 below summarizes the results.²⁰ It is by no means surprising that the X-factor can decrease in the post price cap period. Professor Gollop has found that there is no empirical support for the proposition that there would be an ever-increasing upward trend after the 1993-1995 period. He also found that the continuing trend reversal in labor inputs is a dominant source of the lower X-factors and that the productivity gains resulting from sizable labor force reductions in the early price-cap years could not be sustained in the long run.

Table 3: X-factor Averages pre and post price caps

Years	FCC 97 ¹	USTA ²	FCC 99 "Corrected" ³	Average
(1) 1986-1990	5.24%	5.58%	5.51%	5.44%
(2) 1991-1995	5.22%	2.41%	6.13%	4.59%
(3) 1991-1998		3.29%	6.33%	4.81%
				Difference
(2)-(1)	-0.02%	-3.17%	0.62%	-.85%
(3)-(1)		-2.29%	0.82%	-.63%

¹ 1997 Price Cap Performance Review, Chart D1 column G.

² 1999 FNPRM Price Cap Performance Review, Professor Frank Gollop USTA Comments attachment 2, January 7, 2000, Appendix B, Chart D1 column G.

³ 1999 FNPRM Price Cap Performance Review, Staff Study Appendix B, Table B-12 column I.

D. LECs' choice of a 5.3% X-factor should not be used as a measure of likely productivity increases

38. AT&T argues (Appendix C) that the LECs' revealed valuation of the efficiency impact of the sharing mechanism is 1.3%, because, AT&T says, that when given the choice, most price-cap LECs chose the 5.3% X-factor with no sharing rather than the minimum 4.0% X-factor with full sharing. However, using the difference as a measure of likely productivity increase would be incorrect. The particular spread the Commission selected was designed to encourage carriers to select a high productivity target *on an annual basis*, and in the

²⁰ Indeed, the method described in AT&T's Appendix A produces the same conclusion. The data in Table 1 above show that the average of the "X factors" for the 1991-1995 period is -0.94 percentage points lower than the

process eliminate sharing as part of the price cap plan. There is a fundamental difference between proposing options for annual choices on the part of the RBOCs and *mandatory* elimination of sharing. The year-to-year productivity growth of an individual firm can vary considerably. With annual choice, the objective would be to provide an incentive to stretch to a higher level in otherwise above-average years. In contrast, a productivity target fixed over a number of years would have a correspondingly lower “stretch,” because the variation in the average over a number of years is smaller than annual variations. Therefore, because the Commission’s plan provided sharing as an annual option, its design provided no meaningful guidance for the establishment of a CPD. Further, sharing (or no sharing) was based on *accounting* rather than economic costs. Accordingly, the price-cap LEC’s choices are, at best, only an indirect indicator of expected accounting performance, not expected productivity growth.

IV. OTHER ISSUES

A. AD Hoc’s Cost of Capital Sensitivity Analysis Does not Refute the Fact that LEC Opportunity Costs are Different than Changes in Corporate Bond Rates or Government Securities

39. Ad Hoc claims to have performed sensitivity analyses of the TFP results using the other cost of capital price indices identified as alternatives in the 1999 Study. For example, Ad Hoc estimated TFP growth using Moody’s Aaa corporate bond rate, the 10-year U.S. Treasury securities rate and the 30-year U.S. Treasury securities rate. Ad Hoc’s analyses confirmed that TFP results using these alternative price index series were as indicated in the 1999 Staff Study.
40. Ad Hoc’s analysis does not refute the central fact that using either Moody’s Aaa, Moody’s Baa, or 10-year and 30-year government securities as the cost of capital is improper because it does not adequately represent the market definition of the market cost of capital. The financial debt instruments used by Ad Hoc are not an appropriate measure of LEC

1986-1990 average. The corresponding difference between the 1991-1998 and 1986-1990 periods is -1.02 percentage points.

opportunity costs. Professors Frank Gollop and James H. Vander Weide present estimates of more appropriate cost of capital indices that should be used.²¹ Ad Hoc's analysis does not refute any of the indices estimated by Professor Gollop or Vander Weide.

B. Minutes Should Not be Used to Calculate Local Service Output

41. In its 1999 Study, the FCC Staff uses minutes rather than calls in the local service component of total company output. Ad Hoc (at 8) supports the use of minutes as more appropriate than calls. Ad Hoc observes (at 10) that the ILECs have argued that an economically meaningful X-factor requires that the measure of output used in the model correspond to outputs driving revenue growth. Professor Gollop makes a somewhat similar but slightly different point in his Comments (at 20). He identifies lines rather than calls or minutes as superior and bases his decision on the following:

The choice of an appropriate output measure must follow from the very purpose of the X-Factor as a public policy tool. Since X is used to cap prices and therefore, revenue, output in the X-Factor calculation must be defined as closely as possible to the unit measure on which market price is based.

42. Ad Hoc disagrees, pointing out that the ILECs' arguments support the use of minutes, not calls, since the growth in minutes is the driving force behind the ILEC's local service revenue growth. But, as Professor Gollop observes, the proper criterion for the output measure is the unit on which market price is based. In theory, a proper measure of the growth in output quantity would be a weighted average of the growth rates of physical (not deflated revenue) measures of outputs weighted by revenue shares. More weight in this measure is given to those measures of output that drive revenue. But that unit is mostly made up of lines rather than calls or minutes. The sources of local revenue reveal that more than 80% is generated from lines.²² Moreover, in multiple regression analysis where revenue is regressed on lines, calls and minutes only lines have a statistically significant impact on revenue: changes in calls and minutes have no important impact on revenue,

²¹ USTA Comments, January 7, 2000, Attachments 2 and 5.

²² Professor Frank Gollop Comments at 21.

reflecting the flat-rate nature of most local exchange service.²³ Therefore, if one uses a single physical measure of output, it would be incorrect to use minutes as that output measure.

43. Another argument for using lines instead of calls or minutes is the fact that measures of call and minutes are more prone to measurement error. In its discussion of the quality of its measures of usage, the Commission notes that:

Most subscribers purchase service with unlimited local calling. As a result, most calls are not metered and estimates of total calling are subject to wide margins. Periodic studies are used within the telephone industry to estimate the number of calls and calling minutes for a variety of purposes.²⁴

What Ad Hoc proposes to use as the measure of physical output in a given year is not a direct observation at all but rather the result of “periodic studies” used to estimate unmetered local calling.

C. Ad Hoc’s argument that hedonic changes in ILEC capital inputs give disproportionately greater weight to more recent years is unfounded

44. Ad Hoc argues (at 14) that hedonic changes in ILEC capital inputs have had the effect of bringing their prices down even further as the capabilities and capacities of individual plant components expand. Therefore, Ad Hoc claims it would be appropriate to give the greatest weight to the productivity experience of the most recent time periods. However, the Commission has already rejected any hedonic adjustments in the *1997 Price Cap Performance Review*. As stated by the Commission (§ 67):

We find nothing in this record to suggest that our TFP calculation would be more accurate with a hedonic adjustment. AT&T observes that its hedonic TFP adjustment results in an offsetting adjustment to its input price differential, leaving its X-Factor recommendation unchanged. In addition, neither AT&T nor Ad Hoc have shown that their hedonic adjustments accurately measure the

²³ Data for local revenue, access lines and local DEMs are taken from the Staff 1999 TFP study, Appendix B and data for calls are taken from the Commission’s 1997 TFP study in the *1997 Price Cap Performance Review* and updated to 1998.

²⁴ Federal Communications Commission, Industry Analysis Division, *Trends in Telephone Service*, 12-1, February 1999.

effects of technological improvements. The hedonic adjustment to the price unit of capital proposed by AT&T in its TFP model is incompletely documented, and the details on all the components of the hedonic adjustment are not clear and replicable. Ad Hoc's 10 percent per year adjustment to certain asset price indices is not supported, but stated as an assumption. Based on the record before us, there is no need to include a hedonic adjustment. [footnotes omitted].

45. There is nothing new presented by Ad Hoc to suggest that TFP growth is somehow biased if hedonic adjustments fail to be made. In fact, there are valid economic arguments why hedonic adjustments are not needed in order to estimate the appropriate X-factor. First, while it is true that there has been technological improvements in the recent past, the telecommunications industry has, for the most part, always exhibited significant technological changes. Whether it is the change from manual to electromechanical switches or the change from mechanical to analog switches, the industry is constantly improving its technology. Therefore, choosing a series at random and modifying only part of the series for unmeasured changes in the quality of output misses the fact that the earlier data that are not modified were themselves representative of superior technology *vis-à-vis* earlier periods.
46. And second, the X-factor is designed to estimate industry level unit costs. Hedonic adjustments are made in theory to reflect the fact that new equipment differs from old equipment in technology as well as in price so that adjustments must be made to avoid understating the change in the effective level of real capital stocks. But improved technology and equipment effects unit costs only in the sense that a given level of output can be produced with fewer units of inputs. Or, alternatively, a given level of output now has more bells and whistles or is of higher quality than before. The impact these changes have on TFP growth is not that the capital stock is improperly measured but rather the real impact is that output growth has been affected. Customers, observing the change in quality or options available increase their demand for the products. But this is already revealed in the output data as they exist and so no adjustment is necessary.

D. AT&T's Correction to the Staff's Imputed X Study is incorrect and reveals additional errors with the Staff Study

47. AT&T claims that its Appendix B is a technical correction to the Staff's imputed X study. According to AT&T, the staff's calculation in Table C-1 of the study improperly failed to account for the price cap "reinitialization" that occurred in July 1997²⁵ and, therefore, the imputed X study's X-factor for 1996 should be 6.5% rather than 5.3%. This assertion is incorrect. The same error appears in the Staff's Study which, in some instances, does not use the actual X-factors that were in place during the 1991-1995 time period but rather uses the X-factors that were used to reinitialize the PCI as a result of the *1995 Price Cap Performance Review*.²⁶
48. The Staff's Imputed X study is intended to compare, *inter alia*, the actual operating revenues earned in any given year (which were produced by the *actual* X Factor in place) with the operating revenues that would have been earned under a hypothetical X Factor. Based on the hypothetical X Factor, adjustments are made to actual operating revenues. After several additional steps, a hypothetical rate of return is arrived at and compared to the Staff's erroneous "competitive" rate of return in order to determine the hypothetical X Factor that results in the price cap LEC earning a "competitive" rate of return. By not using the actual X-Factors in place during the years in question, however, the X-factors estimated by both AT&T and the Staff are biased upward. For example, when compared to the hypothetical X-factor of 6.5%, using an X-factor of 6.5% in 1996 as the actual X-factor rather than 5.3% results in a smaller revenue decrease (from imposing a higher X-factor) and, therefore, more "overearnings."²⁷

²⁵ In the *1997 Price Cap Performance Review*, the Commission stated (¶ 179): "[W]e require each price cap LEC to adjust its PCIs, effective July 1, 1997, to the levels for the 1997-98 tariff year that would have been in effect had we adopted the 6.5 percent X-Factor in time to become effective with the LECs' 1996 annual tariff filings."

²⁶ *1995 Price Cap Performance Review*, ¶ 248.

²⁷ As I describe at length in my initial Comments, the Staff's Imputed X-Study is theoretically unsound and inferior to the use of total factor productivity ("TFP") growth to determine the appropriate X-factor in the Commission's price cap plan primarily because it relies on jurisdictionally separated data and an interstate-only calculation makes no economic sense.

49. Thus, in addition to the fundamental flaw in the approach used by AT&T and the Staff, neither party implements the approach correctly. To compare the revenue differences that would have occurred if the X factors differed from their historical values, the X-Factor that should be used is the X-Factor that generated the actual operating revenues used by the Staff in Table C-3. In 1996, the X-factor that brought about the actual operating revenues was 5.3% not 6.5%. Similarly, for some firms in the early years of price cap regulation the X-factor that brought about the actual operating revenues is not 4.0%; rather it is 3.3%. Both the Staff and AT&T create a mismatch because the reinitializations that took place in 1995 and 1997 had no impact on LEC revenue during the years in question. As the Commission stated in the *1997 Price Cap Performance Review* (§ 179):

“[W]e require each price cap LEC to adjust its PCIs, effective July 1, 1997, to the levels for the 1997-98 tariff year that would have been in effect had we adopted the 6.5 percent X-Factor in time to become effective with the LECs’ 1996 annual tariff filings. *This adjustment would have no effect on revenues and earnings for the 1996-97 tariff year – that is, like the adjustment upheld by the court in Bell Atlantic, the adjustment we require in this Order has no retroactive effect.*” [emphasis added].

By not using the actual X-factors that were in place during some years and which were responsible for the actual operating revenues, AT&T and the Staff Study bias their X-factor estimates upward.

V. CONCLUSIONS

50. AT&T must continue to be frustrated in its attempt to develop an economically meaningful and defensible methodology for calculating interstate-only productivity growth.²⁸ After nearly ten years of experience with price cap regulation and with different theoretical and practical approaches to estimating an economically appropriate X-factor, it is time to acknowledge the simple economic fact that when the production process is not separable among services, all the information in the world about interstate input and output quantities and prices is not sufficient to tell us what will happen to unit costs (and thus prices) for

²⁸ Nature abhors impossibility: the recent proof of Fermat’s Theorem has not appeared to reduce the rate at which counterexamples are submitted to number theory web sites.

interstate services. In addition, AT&T and Ad Hoc attempt to leverage conclusions from an SPR model to measure the effect that the elimination of earnings sharing would have on productivity growth of price cap LECs. However, they fail to address the fact that any incentive is already partly included in the X-factor. Regardless, their quantification is flawed to the point of being meaningless. Their critical assumption—that doubling the economic incentive to increase profits doubles productivity growth—finds no support in the SPR Study or in common sense.²⁹ And their comparisons of productivity growth before and after the implementation of price caps are based on flawed measures of post price cap TFP growth.

²⁹ Some years ago, the Belgian government provided modest financial support to families with children. Would doubling this support be expected to double the number of families with children? Double the number of children? Produce children in 4.5 months rather than 9?

VI. APPENDIX

The Indirect Method of Calculating the Change in TFP

Consider a multiproduct firm having N outputs (Q_i^o $i = 1, \dots, N$) and M inputs (Q_j^i $j = 1, \dots, M$). Assume the firm's earnings just recover its cost of capital or that the data has been adjusted so that this assumption is met. The assumption of zero (economic) profit can be written as:

$$\sum_{i=1}^N p_i Q_i^o = \sum_{j=1}^M w_j Q_j^i$$

where p_i and w_j denote output and input prices respectively. Differentiating this identity with respect to time yields:

$$\sum_{i=1}^N \dot{p}_i Q_i^o + \sum_{i=1}^N p_i \dot{Q}_i^o = \sum_{j=1}^M \dot{w}_j Q_j^i + \sum_{j=1}^M w_j \dot{Q}_j^i$$

where a dot indicates a derivative with respect to time. Dividing both sides of the equation by $R = \sum_i p_i Q_i^o$ or $C = \sum_j w_j Q_j^i$, we obtain:

$$\sum \dot{p}_i \left(\frac{Q_i^o}{R} \right) + \sum \dot{Q}_i^o \left(\frac{p_i}{R} \right) = \sum \dot{w}_j \left(\frac{Q_j^i}{C} \right) + \sum \dot{Q}_j^i \left(\frac{w_j}{C} \right)$$

where R and C denote revenue and cost. If r_i denotes the revenue share of output i and c_j denotes the cost share of input j , then:

$$\sum_i r_i dp_i = \sum_j c_j dw_j - \left[\sum_i r_i dQ_i^o - \sum_j c_j dQ_j^i \right]$$

where d denotes a percentage growth rate: $dp_i = \dot{p}_i / p_i$. The first term in the above equation is the revenue weighted average of the rates of growth of output prices and the second is the cost-weighted average of the rates of growth of input prices. The term in brackets is the difference between the rates of growth of weighted averages of outputs and inputs. The term in brackets is thus the change in TFP, and we can write the equation as:

$$dp = dw - dTFP$$

Thus, the growth in input prices less the growth in output prices is equal to the change in TFP. This result requires only that excess profits are zero in every period. It does not require cost minimization, profit maximization, marginal cost pricing, or constant returns to scale.

We have showed that the change in the average industry output price is equal to the change in its average input prices less the change in its total factor productivity. Applying this to the telecommunications industry, we write:

$$(1) \quad p^T = w^T - TFP^T$$

where p^T represents the annual percentage change in the telecommunications industry output prices, w^T represents the annual percentage change in its input prices and TFP^T represents the annual percentage change in its total factor productivity (the ratio of an index of physical quantities of outputs to an index of physical quantities of inputs).

In the long run, since there are no excess profits in the economy as a whole, the relationship among input prices, output prices, productivity, and exogenous cost changes can be derived for the nation as a whole in the same manner as (1) above:

$$(2) \quad p^N = w^N - TFP^N$$

where p^N is the annual change in a national index of output prices, w^N is the annual change in a national index of input prices and TFP^N is the annual change in the economy-wide total factor productivity.

Subtracting equation (2) from equation (1), we see that:

$$(3) \quad p^T = p^N - [TFP^T - TFP^N] + [w^T - w^N]$$

so that X is given by $[TFP^T - TFP^N] - [w^T - w^N]$ which simplifies to AT&T's equation number (1) in Appendix A.

ATTACHMENT 2

**USTA COMMENTS
CC DOCKET NO. 94-1, 96-262
JANUARY 24, 2000**

"Du Pont" Financial Analysis of Interstate Operating Income

For this demonstration, USTA uses the "Du Pont Analysis" from finance.

"The Du Pont Company was a forerunner in stressing that satisfactory return on assets may be achieved through high profit margins or rapid turnover of assets, or a combination of both. The Du Pont system causes the analyst to examine the sources of a company's profitability. Since the profit margin is an income statement ratio, a high profit margin indicates good cost control, whereas a high asset turnover ratio demonstrates efficient use of the assets on the balance sheet. Different industries have different operating and financial structures. For example, in the heavy capital goods industry (machinery and equipment), the emphasis is on a high profit margin with a low asset turnover, while in food processing, the profit margin is low, and the key to satisfactory returns on total assets is a rapid turnover of assets."¹

The profit margin ratio is BOC interstate operating income divided by BOC interstate revenue. The asset turnover ratio is BOC interstate revenue divided by BOC interstate average net investment (ANI). Thus, the Du Pont display is a decomposition of return into the corresponding profit margin and asset turnover ratios.

The first column in Table 1 is the interstate rate of return, which is actual BOC interstate operating income divided by annual average net investment.² The second column shows that the BOC profit margin per dollar of revenue has been very stable under Price Caps.³ Therefore even the separated accounting data shows that LECs have achieved efficiency gains sufficient to absorb the \$6 billion of interstate Price Cap X reductions from 1991-1998. LEC industry efficiency gains are further highlighted by the increasing LEC asset turnover efficiency in the third column.⁴ This shows increasingly higher levels of revenue per dollar of LECs' average net investment.⁵ Of course, all of these effects are more correctly included in the "economically meaningful" total company TFP approach to measuring the X-factor.

¹ Fundamentals of Investment Management, G.A.Hirt and S.B. Block, Irwin, 5th edition, 1996, page 222-223. See also page 86, Fundamentals of Financial Management, 7th edition, Eugene F.Brigham, The Dryden Press, 1995 which defines the Du Pont equation as "A formula that gives the rate of return on assets by multiplying the profit margin by the total assets turnover."

² BOC interstate revenue, actual operating income and ANI was collected from interstate reports but can also be found in Tables 5 and 6, Appendix C, Statistical Data, in Price Cap First Report and Order, released April 7, 1995. More current data since 1992 was collected for the BOC industry from the FCC's "Annual Constant Return" excel spreadsheets from the Imputed X study, available from the CCB web site.

³ Principles of Financial Management, D.R. Emery, J.D. Finnerty, J.D. Stowe, 1998, Prentice Hall. Page 98-99 "Restaurants, for example, operate on lower profit margins than electric companies, jewelers, or banks." Table 4.7 shows a typical electric company net profit margin at 20%, in the range for the BOC interstate results.

⁴ Ibid. "The total asset turnover is largely determined by the production and marketing processes in each particular industry. For example, its not possible to generate electricity without a large investment in plant and equipment." Table 4.7 also shows the typical total asset turnover ratio in the electric industry at 0.5 .

TABLE 1

Interstate return = Operating Income / ANI =

(Operating Income / Revenue) X (Revenue / ANI)

	BOC Interstate Industry Average	=	Income divided by Revenue	X	Revenue divided by Average Net Investment
	Rate of Return	=	Earnings MARGIN	X	Asset Turnover
1987-88	0.1239	=	0.2072	X	0.5980
1989-90	0.1191	=	0.1946	X	0.6120
1991	0.1179	=	0.1914	X	0.6159
1992	0.1252	=	0.1934	X	0.6471
1993	0.1352	=	0.2005	X	0.6744
1994	0.1368	=	0.1958	X	0.6987
1995	0.1413	=	0.1995	X	0.7086
1996	0.1458	=	0.2042	X	0.7140
1997	0.1478	=	0.2004	X	0.7378
1998	0.1567	=	0.1998	X	0.7843

INPUTS TO

SECTION ABOVE:

	BOC Average		
\$ millions	Interstate Net Investment	BOC Net Oper. Income	BOC Interstate Revenues
1987-88	\$ 26,057	\$ 3,228	\$ 15,583
1989-90	\$ 25,512	\$ 3,038	\$ 15,615
1991	\$ 25,103	\$ 2,959	\$ 15,461
1992	\$ 24,795	\$ 3,103	\$ 16,044
1993	\$ 24,637	\$ 3,331	\$ 16,614
1994	\$ 25,011	\$ 3,422	\$ 17,476
1995	\$ 25,523	\$ 3,608	\$ 18,085
1996	\$ 26,164	\$ 3,815	\$ 18,681
1997	\$ 25,578	\$ 3,781	\$ 18,872
1998	\$ 25,321	\$ 3,969	\$ 19,858

⁵ Essentials of Investments, Z. Bodie, A. Kane, A.J. Marcus, 2d edition, Irwin, 1995, page 361. "...the ratio of sales to assets, is known as the **asset turnover** (ATO). It indicates the efficiency of the firm's use of assets in the sense that it measures the annual sales generated by each dollar of assets."

Access Ratepayers have gained the majority share of Price Cap benefits.

Table 2 shows that the improvement in LECs' interstate earnings represents approximately 27% of the total Price Cap efficiency benefits. The majority balance of 73% represents interstate access reductions for ratepayers of over \$2.8 billion just from 1991 through 1995. This 27% benefit share to LECs reflects interstate earnings gains of approximately \$1 billion, compared to total efficiency benefits of almost \$3.9 billion over 1991 to 1995. This period included the highest LEC efficiency initiatives in the form of major force reductions.

The analysis in Table 2 uses verifiable LEC interstate rate change and earnings data. Data sources are indicated in the third column of Table 2. However, USTA continues to caution that interstate accounting is the lesser alternative to the more "economically meaningful" total company TFP approach.

TABLE 2

1991-1994 CUMULATIVE LEC INTERSTATE RATE REDUCTIONS (\$millions)	\$2,121	Table 6, Appendix C, FCC First Report and Order, April 7, 1995
1995 INTERSTATE REDUCTIONS	\$723	LEC Tariff filings, 1995 calendar impact
TOTAL REDUCTIONS 1991-1995	\$2,844	Reductions to interstate ratepayers, includes sharing, pricing below cap
TOTAL 1991 Interstate Earnings At 11.25% on 1991 ANI rate base	\$3,445	Table 5, pg. 2, Appendix C, 1 st R&O = .1125 x \$30,624 LEC ANI
TOTAL 1995 Interstate Earnings	\$4,486	Col. H, pg. 1 FCC "Constant Return" Spreadsheet from FNPRM Imputed X
Interstate Earnings Gain 1991-1995	\$1,041	1995 earnings vs. 1991 at 11.25%
Total of 1991-1995 Rate Reductions and LEC interstate earnings gain	\$3,885	SUM: \$2,844 + \$1,041
LEC interstate earnings gain 1991-1995 as share of total interstate efficiency benefits	26.8%	\$1,041 earnings gain relative to total efficiency gains of \$3,885, 1991-1995

Price Cap LEC Investment Impact

The IXCs' Comments support the FNPRM proposition that billions of past interstate industry earnings and employee severance payments have been "excessive". This self-serving assessment is used to rationalize making billions of reductions to LEC industry earnings year by year. The FNPRM analysis reduces earnings and revenues based on a path defined by Baa bond movements down to an 8.68% cost of capital, as shown in Table C-3 of the FNPRM Imputed X study. AT&T, on the other hand, adjusts past LEC earnings and revenues down from 11.25% in 1991 on a straight line to 8.63% in 1998 (for example, AT&T Comments Appendix A, at Table A-2)

Annual new BOC industry plant investment has totaled \$196 billion over 1986 to 1998 and totaled \$129 billion during the 1991-1998 Price Cap period.¹ However, the adjustments for "excess" earnings in the FCC FNPRM, plus the FCC disallowances for "excess" severance, would have removed a total of over \$36 billion in actual BOC income for the 1991-1998 period.

Compared to actual BOC industry income for the 1991-1998 period, such an adjustment would be equivalent to a loss of BOC investment funding support of approximately 28% against the actual BOC new plant investment of \$128.9 billion.

¹ Annual BOC new plant investment can be found in the X-factor TFP studies, for example, in the column "Adjusted Capital Additions", Table B-7, page 59 of the FNPRM in this proceeding. The second column can be found at the last column of FNPRM Table B-7, except that 1998 is adjusted to remove SNET, which was not included in the prior years' history. The FCC Adjusted property income can be found at the second column FNPRM Table B-10, but is also reduced for the "excess" severance payment adjustments from the sixth column of FNPRM Table B-5. The last column in Table 3 is the difference between actual BOC property income and the "FCC Adjusted" series.

TABLE 3

\$ millions	Annual BOC Gross Plant Investment	ACTUAL BOC Property Income incl. Deprec.	FCC Adjusted Property Income - "excess" labor	FCC Investment Fund Reductions \$ millions
1986	\$ 13,180	\$ 26,793	\$ 21,249	\$ (5,544)
1987	\$ 12,555	\$ 27,702	\$ 22,444	\$ (5,258)
1988	\$ 14,285	\$ 26,866	\$ 23,494	\$ (3,372)
1989	\$ 13,284	\$ 25,846	\$ 23,723	\$ (2,123)
1990	\$ 14,476	\$ 25,585	\$ 24,600	\$ (985)
1991	\$ 14,527	\$ 24,641	\$ 24,019	\$ (622)
1992	\$ 14,612	\$ 26,477	\$ 23,274	\$ (3,203)
1993	\$ 14,860	\$ 26,915	\$ 21,728	\$ (5,187)
1994	\$ 14,718	\$ 26,366	\$ 22,683	\$ (3,683)
1995	\$ 15,375	\$ 27,166	\$ 23,270	\$ (3,896)
1996	\$ 18,026	\$ 30,415	\$ 24,090	\$ (6,325)
1997	\$ 18,253	\$ 30,680	\$ 25,311	\$ (5,369)
1998	\$ 18,554	\$ 33,341	\$ 25,267	\$ (8,074)

\$ millions	BOC ACTUAL Plant Investment	ACTUAL BOC Property Income	FCC Adjusted Property Income
SUM 1991 - 1998	\$ 128,925	\$ 226,001	\$ 189,642

**FCC FNPRM Investment
Funding Reduction
1991-1998 Total**

\$ - 36,359 million

= - 28.2% funding reduction

ATTACHMENT 3

**USTA COMMENTS
CC DOCKET NO. 94-1, 96-262
JANUARY 24, 2000**

Joel Popkin and Company

ECONOMIC CONSULTANTS

Review of TFPRP Model for USTA

Statement by Stephen B. Pociask

**Executive Vice President and Chief Economist
Joel Popkin and Company
Washington, DC**

January 21, 2000

At the request of the United States Telecom Association (USTA), I have reviewed its TFPRP model and results. My review included an assessment of the model – both in terms of productivity theory and spreadsheet logic – in order to determine whether the TFPRP model has been appropriately updated through 1998. My conclusion is that USTA's TFPRP model is internally consistent and defines productivity growth in a theoretically sound manner.

The update of 1998 required both company-specific data for the local exchange companies and macroeconomic data. I performed a company-by-company check of the reasonableness of the data. While I found the year-to-year changes to be reasonable and consistent given historical financial trends and regulatory events (e.g., access reform), I have not audited the primary LEC data back to its company sources and therefore have no opinion on their precision. In regard to the macroeconomic data inputs, which include national input prices, data from the National Income and Product Accounts, and multi-factor productivity estimates for the U.S. economy, I updated the data for 1997 and 1998 and linked these data to the earlier series in the model.

The model incorporates accepted TFP methods in its formulae and spreadsheet design. Price and quantity growth rates consistently utilize logarithms in the calculation of TFP and the X-Factor. Consistent with standard Tornquist indexing, biannual arithmetic averages of cost shares and biannual arithmetic averages of revenue shares are applied to calculate aggregate annual growth rates. The Tornquist technique is appropriately applied to the measurement of outputs, inputs and TFP. All spreadsheet formulae and updated data used in 1998 are consistent with formulae and data used in the prior years.

In sum, my overall assessment is that the updated USTA TFPRP model is designed consistent with standard TFP methodology and its results appear to produce reasonable estimates of the X-Factor.

USTA X-FACTOR SUMMARY REPORT

1998 Total Factor Productivity Review Plan
Input Inflation Differential Development

Item	Source	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
ANNUAL TFP DIFFERENTIAL												
100	LEC TFP											
110	U.S. TFP		1.77%	3.85%	2.02%	3.78%	3.47%	2.33%	3.80%	6.23%	1.06%	3.50%
120	TFP DIFFERENTIAL		-0.26%	-0.21%	-1.04%	1.49%	0.62%	0.60%	0.39%	0.69%	0.68%	0.68%
130	5 Year Average TFP		2.03%	4.07%	3.06%	2.29%	2.85%	1.73%	3.41%	5.24%	0.37%	2.81%
140	TFP DIFFERENTIAL		N/A	N/A	N/A	N/A	2.86%	2.80%	2.66%	3.28%	2.98%	2.89%
150	5 Year Average TFP											
LEC INPUT INFLATION DEVELOPMENT												
AVG INPUT SHARES												
200	Capital		0.5024	0.4937	0.4970	0.5092	0.5236	0.5222	0.5212	0.5231	0.5282	0.5360
210	Labor		0.2717	0.2690	0.2658	0.2576	0.2548	0.2525	0.2425	0.2330	0.2204	0.2076
220	MR&S		0.2259	0.2373	0.2382	0.2330	0.2216	0.2253	0.2363	0.2439	0.2514	0.2665
INPUT COST GROWTH												
230	Capital		-5.13%	5.27%	3.92%	8.81%	5.85%	2.87%	2.98%	-0.11%	6.84%	4.43%
240	Labor		0.19%	1.33%	2.70%	0.61%	6.08%	1.43%	-3.21%	1.43%	-3.84%	0.34%
250	MR&S		10.74%	2.98%	6.46%	-3.90%	2.99%	9.69%	6.17%	2.35%	8.49%	3.88%
INPUT COSTS												
260	Capital		3.80%	2.40%	2.83%	2.44%	2.51%	2.24%	2.01%	2.03%	3.33%	3.43%
270	Labor		-1.63%	-3.25%	-5.09%	-4.76%	-4.47%	-5.64%	-7.01%	-4.22%	-1.01%	0.15%
280	MR&S		6.34%	-1.45%	2.53%	-7.03%	0.06%	7.00%	3.68%	0.10%	6.64%	2.71%
INPUT PRICE GROWTH												
290	Capital		-8.83%	2.87%	1.09%	6.37%	3.34%	0.73%	0.98%	-2.14%	3.51%	1.00%
300	Labor		1.82%	4.69%	7.76%	5.37%	10.55%	7.07%	3.81%	1.61%	-2.83%	0.19%
310	MR&S		4.40%	4.43%	3.95%	3.13%	2.93%	2.69%	2.48%	2.25%	1.84%	1.17%
LEC INPUT INFLATION												
320	Annual		-3.00%	3.70%	3.54%	5.36%	5.09%	2.78%	2.02%	-0.20%	1.70%	0.88%
330	5 Year Moving Average						2.94%	4.09%	3.76%	3.01%	2.28%	1.43%
U.S. INPUT INFLATION												
400	U.S. TFP (Annual)		-0.26%	-0.21%	-1.04%	1.49%	0.62%	0.60%	0.39%	0.69%	0.69%	0.69%
410	5 Year Moving Average (Curr)		N/A	N/A	N/A	N/A	0.12%	0.28%	0.42%	0.64%	0.40%	0.49%
420	% Change in GDPPI (Annual)		4.40%	4.43%	3.85%	3.13%	2.95%	2.69%	2.49%	2.25%	1.84%	1.17%
430	5 Year Moving Average (Curr)		N/A	N/A	N/A	N/A	3.77%	3.43%	2.76%	2.49%	2.19%	1.77%
U.S. INPUT INFLATION												
440	Annual		4.14%	4.22%	2.91%	4.61%	3.55%	3.29%	2.85%	3.24%	2.53%	1.88%
450	5 Year Moving Average						3.86%	3.72%	3.19%	3.13%	2.58%	2.26%
INPUT INFLATION DIFFERENTIAL												
500	Annual		-7.13%	-0.52%	0.63%	0.75%	1.54%	-0.52%	-0.87%	-3.44%	-0.84%	-0.88%
510	5 Year Moving Average						-0.95%	0.38%	0.56%	-0.12%	-0.31%	-0.62%
X FACTOR												
600	Annual		9.16%	4.59%	2.43%	1.55%	1.31%	2.25%	4.28%	8.68%	1.20%	3.79%
610	5 Year Moving Average						3.81%	2.43%	2.10%	3.40%	3.29%	3.71%
SUMMARY: 5 Year Moving Averages												
700	5 YR AVG TFP DIFF		N/A	N/A	N/A	N/A	2.86%	2.80%	2.66%	3.28%	2.98%	2.89%
710	5 YR AVG INPUT INFL DIFF		N/A	N/A	N/A	N/A	-0.95%	0.38%	0.56%	-0.12%	-0.31%	-0.62%
720	5 YR AVG X-FACTOR		N/A	N/A	N/A	N/A	3.81%	2.43%	2.10%	3.40%	3.29%	3.71%

Item	Source	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
100 Total Switched Access Lines	4308, Table II, r.910, c.cj	112,217,077	116,535,400	119,227,701	123,353,984	125,578,899	128,521,137	133,160,832	138,323,336	144,852,880	152,164,275	157,485,726
MINUTES OF USE (4301) :												
Common Line:												
110 Originating Premium	4301, Table II, r.2010	95,445,094,000	107,582,407,000	120,387,201,000	128,248,833,000	134,730,086,830	142,534,262,743	150,568,824,000	154,807,223,000	154,028,023,000	158,885,134,000	160,527,411,000
120 Terminating Premium	4301, Table II, r.2020	117,020,520,000	135,606,343,000	149,424,148,000	160,387,789,000	172,977,212,400	187,632,698,096	203,753,076,000	228,373,066,000	261,001,967,000	283,657,515,000	301,574,603,000
130 Originating NonPremium	4301, Table II, r.2030	1,807,948,000	1,428,082,000	1,086,300,000	707,543,000	401,281,000	241,878,000	152,080,000	138,438,000	79,058,000	47,503,000	76,686,000
140 Terminating NonPremium	4301, Table II, r.2040	5,870,275,000	4,579,900,000	2,807,521,000	1,987,887,000	1,330,352,000	855,301,000	655,211,000	457,286,000	340,889,000	204,884,000	379,366,000
150 Sw Traffic-Sensitive (Prem&NonPrem)	4301, Table II, (r.2050+r.2060)	239,891,396,000	285,468,154,000	283,835,482,000	297,438,355,000	324,311,554,000	333,358,172,250	361,402,276,000	389,788,018,000	421,895,031,000	451,426,381,000	470,254,288,000

Item	Source	1988	1989	1980	1981	1992	1993	1994	1995	1996	1997	1998
EXPENSE DATA (4302) :												
100 Total Operating Expenses	4302, Table I-1-4, r.720, c.ab	55,170,278,000	57,432,289,000	58,447,840,000	59,968,374,000	59,642,816,000	62,226,713,000	65,565,061,000	66,952,522,000	67,951,758,000	69,798,998,000	71,848,427,000
110 Depreciation & Amortization	4302, Table I-1-3, r.6590, c.ab	16,021,903,000	16,286,221,000	16,427,540,000	16,013,519,000	16,358,255,000	16,885,243,000	17,743,325,000	18,446,323,000	18,481,214,000	19,987,384,000	20,879,381,000
120 Wages & Salaries	4302, Table I-1-4, r.720, c.ac	17,702,530,000	17,666,806,000	17,878,658,000	17,738,480,000	17,663,812,000	17,802,446,000	17,596,539,000	17,640,465,000	17,815,572,000	17,833,843,000	18,015,245,000
130 Fringe Benefits	4302, Table I-1-4, r.720, c.ad	4,201,210,000	4,278,893,000	4,380,014,000	5,108,748,000	5,322,788,000	6,825,305,000	7,182,368,000	6,356,310,000	5,563,285,000	4,663,912,000	4,559,470,000
OPERATING TAXES (4302) :												
200 ITC-Net	4302, Table I-1-5, r.7210, c.bb	865,968,326	803,996,000	725,102,000	665,933,000	603,281,000	554,943,000	486,464,000	381,993,000	351,000,000	286,801,000	236,970,000
210 FIT	4302, Table I-1-5, r.7220, c.bb	4,487,235,000	3,869,122,000	4,378,359,000	4,727,925,000	4,973,794,000	5,607,106,000	5,570,928,000	5,397,607,000	6,288,239,000	5,940,671,000	6,761,184,000
220 State and Local	4302, Table I-1-5, r.7230, c.bb	764,070,000	632,729,000	680,301,000	764,550,000	699,881,000	798,731,000	871,443,000	738,142,000	821,497,000	798,042,000	1,098,734,000
230 Property	4302, Table I-4, r.940, c.c	2,300,981,427	2,431,872,802	2,507,425,520	2,466,785,724	2,408,018,000	2,423,627,000	2,419,539,000	2,360,675,000	2,458,930,000	2,386,513,000	2,407,279,000
240 Gross Receipts	4302, Table I-4, r.940, c.d	1,384,723,594	1,277,164,445	1,237,745,943	1,366,201,366	1,376,978,000	1,412,557,000	1,421,510,000	1,428,893,000	1,381,697,000	1,409,807,000	1,419,537,000
250 Capital Stock	4302, Table I-4, r.940, c.e	101,807,366	124,717,280	132,885,705	146,008,692	158,786,000	163,307,000	152,468,000	140,843,000	145,628,000	130,187,000	127,860,000
260 Other	4302, Table I-4, r.940, c.g	127,863,422	132,827,072	146,630,929	147,563,418	146,199,000	192,054,000	183,629,000	214,675,000	270,367,000	235,585,000	242,726,000
LABOR DATA (4302) :												
300 End of Year Employee Counts	4302, Table I-1-6, r.830, c.bb	574,312	568,326	537,774	514,318	488,880	470,509	438,229	409,083	401,322	400,909	402,558

Item	Source	Gross Additions Inputs										
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
(a) General Support Facilities												
100	2112 Motor Vehicles	266,537,000	287,619,000	278,415,000	269,825,000	205,705,000	193,336,000	184,027,000	200,387,000	196,178,000	250,815,000	334,880,000
110	2115 Garage Work Equip	11,335,000	10,876,000	14,617,000	13,281,000	12,173,000	10,362,000	6,492,000	5,300,000	4,048,000	4,534,000	7,636,000
120	2116 Other Work Equip	177,131,000	163,620,000	180,577,000	177,330,000	193,088,000	170,197,000	172,191,000	158,183,000	328,078,000	246,079,000	197,545,000
130	2121 Buildings	678,405,000	716,551,000	860,433,000	836,564,000	831,155,000	798,353,000	799,314,000	1,012,376,000	809,051,000	815,511,000	889,897,000
140	2122 Furniture	136,420,000	55,901,000	53,881,000	49,574,000	18,837,000	24,540,000	26,760,000	28,162,000	18,193,000	8,859,000	8,242,000
150	2123 Office Equipment	438,088,000	312,821,000	367,350,000	244,867,000	236,882,899	212,811,000	220,300,000	195,820,000	171,845,000	152,602,000	125,209,000
160	2124 Genl Purpose Computers	1,099,011,000	1,251,509,000	1,210,606,000	1,250,804,000	1,361,389,000	1,337,134,000	1,464,842,000	1,608,271,000	1,361,591,000	1,159,808,000	947,358,000
170	(b) Central Office	4,751,002,000	4,090,523,000	4,324,235,000	4,115,365,000	4,428,370,000	4,289,215,000	4,369,533,000	3,745,805,000	5,040,234,000	5,323,221,000	5,755,352,000
180	(c) Operator Systems	148,469,000	64,168,000	173,212,000	169,284,000	115,565,000	144,345,000	91,138,000	94,978,845	51,447,000	74,444,000	43,117,000
190	(d) Transmission	3,687,577,000	3,322,019,000	3,490,692,000	3,764,518,000	3,905,562,000	4,242,600,000	4,550,136,000	4,960,040,000	6,027,765,000	6,323,442,000	6,853,413,000
200	(e) Information Orig/Term	400,002,000	409,434,000	419,613,000	415,814,000	441,774,000	476,581,000	346,421,000	591,899,000	540,325,000	519,008,000	505,487,000
210	(f) Cable and Wire	5,007,905,000	5,022,754,000	5,928,238,000	5,783,188,000	5,731,800,000	5,644,917,000	5,249,384,000	5,358,204,000	6,263,137,000	6,635,328,000	6,519,911,000

Item	Source	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Revenue Inputs												
100 Basic Local Service	4302, Table I-1-1, r.520, c.b	32,971,012,000	33,758,128,000	34,857,225,000	38,353,114,000	37,848,452,000	39,443,835,000	40,730,878,000	43,261,285,000	46,373,510,000	48,711,603,000	51,451,792,000
110 LD Network Service	4302, Table I-1-1, r.525, c.b	13,109,906,000	13,291,607,000	13,215,606,000	12,670,381,000	12,229,950,000	12,283,856,000	11,951,957,000	10,036,028,000	8,741,771,000	8,604,982,000	7,676,570,000
120 Network Access	4302, Table I-1-1, r.5080, c.b	24,133,705,000	24,213,716,000	24,036,052,000	24,196,707,000	24,662,657,000	25,395,326,000	26,415,053,000	27,198,094,000	28,427,812,000	29,376,896,000	30,863,209,000
130 End User	4302, Table I-1-1, r.5081, c.b	4,118,822,000	5,050,401,000	5,370,514,000	5,552,710,000	5,708,659,000	6,037,423,000	6,400,049,000	6,617,216,000	6,822,277,000	7,202,744,000	8,880,541,000
140 Switched Access	4302, Table I-1-1, r.5082, c.b	11,617,855,000	10,985,805,000	10,425,760,000	10,366,591,000	10,512,981,000	10,761,621,000	11,182,374,000	11,255,672,000	11,454,360,000	10,795,569,000	9,231,071,000
150 Special Access	4302, Table I-1-1, r.5083, c.b	2,778,884,000	2,486,187,000	2,446,865,000	2,352,593,000	2,384,838,000	2,332,938,000	2,454,091,000	2,792,714,000	3,409,082,000	4,316,434,000	5,437,271,000
160 State Access	4302, Table I-1-1, r.5084, c.b	5,618,140,000	5,681,341,000	5,792,915,000	5,932,810,000	6,048,149,000	6,266,343,000	6,378,539,000	6,532,493,000	6,743,075,000	7,062,129,000	7,334,382,000
170 Miscellaneous	4302, Table I-1-1, r.5200, c.b + (starting with 1988) r.5280, c.b	7,453,484,000	7,813,338,000	8,059,253,000	8,450,900,000	7,948,212,000	8,341,236,000	8,520,280,000	9,041,751,000	9,926,353,000	10,124,793,000	11,318,783,000
200 Common Line	4301, Table I, r.1020, c.m	8,500,408,000	8,357,616,000	8,210,261,000	8,077,652,000	8,114,919,000	8,838,506,000	9,623,506,000	9,874,383,000	10,028,764,000	10,220,676,000	12,267,704,000
210 Switched Traffic Sensitive	4301, Table I, r.1020, c.r	7,239,420,000	7,668,493,000	7,407,810,000	7,445,438,000	7,794,244,000	7,770,380,000	7,721,726,000	7,942,538,000	8,185,421,000	7,684,205,000	5,741,215,000

Item	Source	1/1/1988	Other Inputs										
			1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
STARTING TOTAL PLANT IN SERVICE													
100 Motor Vehicles (acct: 2112)	ARMIS 4302, Table B-1-2, col. (ab)	2,104,034,000											
110 Garage Work Eqpt. (2115)	ARMIS 4302, Table B-1-2, col. (ab)	85,885,000											
120 Other Work Eqpt. (2116)	ARMIS 4302, Table B-1-2, col. (ab)	1,223,334,000											
130 Buildings (2121)	ARMIS 4302, Table B-1-2, col. (ab)	15,108,895,000											
140 Furniture (2122)	ARMIS 4302, Table B-1-2, col. (ab)	1,171,779,000											
150 Office Eqpt. (2123)	ARMIS 4302, Table B-1-2, col. (ab)	2,801,610,000											
160 Genl Purpose Computers (2124)	ARMIS 4302, Table B-1-2, col. (ab)	5,662,910,000											
170 Central Office Switches (2210)	ARMIS 4302, Table B-1-2, col. (ab)	40,348,576,000											
180 Operator Systems (2220)	ARMIS 4302, Table B-1-2, col. (ab)	656,408,000											
190 Transmission Eqpt. (2230)	ARMIS 4302, Table B-1-2, col. (ab)	31,035,526,000											
200 IOT Eqpt. (2310)	ARMIS 4302, Table B-1-2, col. (ab)	17,928,984,000											
210 Cable & Wire (2410)	ARMIS 4302, Table B-1-2, col. (ab)	78,977,533,000											
220 END OF YEAR EMPLOYEES	Form M Totals	587,765											
RATE CHANGE DATA													
Local													
300 Credit	Form M Totals	(53,372,000)	(53,372,000)	(103,148,360)	(97,449,700)	(56,986,874)	(64,425,378)	(49,054,610)	(100,000)	15,781,000	0	0	(3,541,842)
310 Annualized Revenue Change	Form M Totals	(612,136,294)	(612,136,294)	(861,927,645)	(847,844,631)	229,958,538	(159,513,750)	101,564,752	(543,069,340)	129,935,000	101,414,000	166,456,120	134,876,496
320 Effective Rate Change	Form M Totals	(323,377,709)	(323,377,709)	(765,200,817)	(816,294,677)	246,954,789	(70,921,207)	56,856,331	(405,572,409)	111,022,871	15,953,882	117,820,460	56,123,197
Intrastate													
330 Credit	Form M Totals	0	0	0	(14,860,000)	(1,950,000)	(3,053,622)	(1,430,000)	(4,200,000)	0	0	0	0
340 Annualized Revenue Change	Form M Totals	(149,695,234)	(149,695,234)	(283,959,445)	(283,959,445)	(66,726,640)	(138,473,818)	(294,367,655)	(306,284,704)	(211,244,000)	(194,754,100)	(207,619,700)	(309,584,128)
350 Effective Rate Change	Form M Totals	(129,635,561)	(129,635,561)	(1,294,641)	(86,548,763)	(27,156,807)	(72,323,751)	(117,595,024)	(134,766,289)	(141,256,636)	(120,225,316)	(138,547,966)	(177,685,703)
Toll													
360 Credit	Form M Totals	(587,472)	(587,472)	0	19,797,000	0	0	(1,500,000)	1,000,000	(3,073,000)	0	(3,562,000)	0
370 Annualized Revenue Change	Form M Totals	(141,987,579)	(141,987,579)	(173,889,929)	(521,665,945)	(61,416,648)	(210,937,296)	(171,239,732)	(32,546,069)	(644,755,000)	25,885,400	(132,152,800)	27,425,288
380 Effective Rate Change	Form M Totals	(78,008,775)	(78,008,775)	(109,325,726)	(158,452,889)	(35,349,394)	(146,935,103)	(82,577,798)	(58,801,641)	(570,285,203)	6,125,277	(84,898,611)	5,222,039

1998 Total Factor Productivity Review Plan
Miscellaneous Inputs

Item	Source	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
BEA PRICE INDEXES																
Motor Vehicles																
102	Current View of Curr. Year		98.40	100.00	103.40	107.00	108.20	111.70	116.70	121.90	125.80	111.872	112.410	111.720	112.410	98.480
104	Current View of Prior Year	N/A	93.90	98.40	100.00	103.40	107.00	108.20	111.70	116.70	121.90	108.739	111.710	112.420	111.710	98.500
105	% Change: Motor Veh. Index	N/A	4.75%	1.61%	3.34%	3.42%	1.12%	3.18%	4.36%	4.36%	3.15%	2.84%	0.62%	-0.62%	-1.02%	
Garage & Other Work Equip																
112	Current View of Curr. Year	N/A	99.00	100.00	101.90	103.90	106.20	108.30	109.70	110.70	112.50	100.827	96.620	93.880	94.010	
114	Current View of Prior Year	N/A	97.50	98.00	100.00	101.90	103.80	106.20	108.30	109.70	110.70	100.605	98.890	96.800	97.370	
116	% Change: Gar&OthWorkEquip	N/A	1.53%	1.01%	1.98%	1.84%	2.18%	1.96%	1.28%	0.81%	1.61%	0.22%	-2.32%	-3.06%		
Furniture and Office Equipment																
122	Current View of Curr. Year	N/A	97.00	100.00	105.60	109.40	113.30	115.40	116.20	118.20	123.00	107.592	110.120	111.930	102.210	
124	Current View of Prior Year	N/A	93.70	97.00	100.00	105.60	108.40	113.30	115.40	118.20	118.20	104.626	107.620	110.170	101.700	
126	% Change: Furn&OffEquip	N/A	3.46%	3.05%	5.45%	3.54%	3.50%	1.84%	0.69%	1.71%	3.98%	2.80%	1.58%	1.58%	0.50%	
Gen Purpose Computers																
132	Current View of Curr. Year	N/A	113.70	100.00	95.30	80.00	82.40	73.70	66.40	58.30	55.20	73.525	53.620	42.440	57.380	
134	Current View of Prior Year	N/A	131.90	113.70	100.00	95.30	82.40	82.40	73.70	66.40	58.30	81.649	67.890	53.870	77.510	
136	% Change: Gen Purp Computers	N/A	-14.85%	-12.84%	-4.81%	-5.72%	-8.82%	-11.18%	-10.43%	-11.31%	-7.16%	-10.48%	-23.73%	-23.85%	-30.07%	
Computer Equipment																
142	Current View of Curr. Year	N/A	97.50	100.00	98.60	100.60	102.10	103.70	105.10	106.80	108.00	104.243	94.310	92.980	97.330	
144	Current View of Prior Year	N/A	95.50	97.50	100.00	99.60	101.00	102.10	103.70	105.10	106.80	102.961	95.740	93.990	98.930	
146	% Change: CommEquip	N/A	2.07%	2.53%	-0.40%	1.30%	1.18%	1.55%	1.54%	1.60%	1.12%	1.24%	-1.50%	-0.84%	-1.63%	
Telecommunications Structures																
152	Current View of Curr. Year	N/A	100.00	100.00	101.00	110.00	113.00	114.00	114.00	115.00	116.60	103.429	116.820	110.450	101.740	
154	Current View of Prior Year	N/A	101.00	100.00	100.00	101.00	110.00	113.00	114.00	115.00	116.60	102.922	113.330	113.910	101.740	
156	% Change: Telecom Structures	N/A	-1.00%	0.00%	1.00%	8.54%	2.68%	0.88%	0.00%	0.87%	3.08%	0.77%	3.03%	-3.08%	0.00%	
OTHER INDEXES AND DATA BY YEAR (see note 6)																
GDPPI																
BEA, Natl Inc&Prod Accts																
201	Current View of Curr. Year	N/A	N/A	100.03	103.95	108.63	113.55	118.13	121.88	126.50	128.93	107.575	110.213	111.570	102.860	
202	Current View of Year (t-1)	N/A	N/A	N/A	100.03	103.95	108.63	113.55	118.13	126.50	128.93	107.575	110.213	111.570	102.860	
203	Current View of Year (t-2)	N/A	N/A	N/A	N/A	N/A	103.95	108.63	113.55	118.13	126.50	107.575	110.213	111.570	102.860	
204	Current View of Year (t-3)	N/A	N/A	N/A	N/A	N/A	100.03	103.95	108.63	113.55	118.13	100.000	102.837	105.087	98.100	
205	Current View of Year (t-4)	N/A	N/A	N/A	N/A	N/A	N/A	100.03	103.95	108.63	113.55	97.325	100.000	102.837	98.140	
206	Current View of Year (t-5)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	100.03	103.95	108.63	93.625	97.325	100.000	94.170	
207	% Change: GDPPI (t) over (t-1)	N/A	N/A	N/A	N/A	4.40%	4.43%	3.95%	3.13%	2.93%	2.69%	2.49%	2.25%	1.84%	1.17%	
Special Access Growth Rate																
210	Special Access Growth Rate	N/A	N/A	N/A	N/A	-7.84%	-1.06%	2.57%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Special Access API as of 1/1																
220	Special Access API as of 1/1	N/A	N/A	N/A	N/A	N/A	N/A	99.3753	98.9917	97.1108	98.0858	85.6576	81.3776	79.8547	61.8407	
221	LEC TRPs, weighted by revenue	N/A	N/A	N/A	N/A	N/A	N/A	98.1583	98.8728	96.8818	97.9792	85.8509	80.7856	79.6211	61.8900	
240	as of 1/1	N/A	N/A	N/A	N/A	N/A	N/A	98.3981	98.0450	89.4779	85.7953	81.1648	80.2325	66.9488	56.1781	
250	as of 1/01	N/A	N/A	N/A	N/A	N/A	N/A	88.2865	87.4509	85.1071	85.1071	81.0575	80.0012	66.7213	58.0549	
255	as of 1/1(t+1)	N/A	N/A	N/A	N/A	N/A	N/A	86.9917	87.1108	88.0868	85.8576	81.0519	79.8547	62.5620	58.0064	
U.S. TFP																
U.S. Dept. of Labor (see Notes 6 & 7 below)																
281	Current View of Curr. Year	N/A	N/A	N/A	3446.299	3437.270	3429.911	3394.427	3445.228	3466.494	3487.354	102.2	101.3	102.0	102.7	
282	Current View of Year (t-1)	N/A	N/A	N/A	3446.299	3437.270	3429.911	3394.427	3445.228	3466.494	3487.354	101.6	100.6	101.3	101.3	
283	Current View of Year (t-2)	N/A	N/A	N/A	N/A	N/A	3446.299	3429.911	3429.911	3394.427	3394.427	100.5	100.2	100.3	100.3	
284	Current View of Year (t-3)	N/A	N/A	N/A	N/A	N/A	N/A	3446.299	3429.911	3394.427	3394.427	100.5	100.2	100.6	100.3	
285	Current View of Year (t-4)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3446.299	3429.911	3429.911	99.1	100.0	100.2	100.2	
286	Current View of Year (t-5)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3429.911	3429.911	98.1	98.1	100.0	100.2	
289	% Change: U.S. TFP (t) over (t-1)	N/A	N/A	N/A	N/A	-0.25%	-0.21%	-1.04%	1.49%	0.62%	0.60%	0.39%	0.99%	0.69%		

1989 Total Factor Productivity Review Plan
Miscellaneous Inputs

Item	Source	1995	1996	1997	1998	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
GROSS ADDITIONS															
300 Motor Vehicles	used 1988 values as surrogate	280,587,000	280,587,000	280,587,000	280,587,000										
301 Range & Other Work Equip	used 1988 values as surrogate	84,104,000	84,104,000	84,104,000	84,104,000										
320 Office Equip	used 1988 values as surrogate	59,400,000	59,400,000	59,400,000	59,400,000										
330 General Purpose Computers	used 1988 values as surrogate	1,110,923,000	1,110,923,000	1,110,923,000	1,110,923,000										
340 Total	Sum of 300 thru 330	2,168,178,000	2,168,178,000	2,168,178,000	2,168,178,000										
COST OF CAPITAL															
Lines 402 thru 464 shown in Millions of \$ (see note 6)															
SCB Table 1.1 Line 1															
402 Gross Domestic Product		N/A	4,268.6	4,538.9	4,900.4	5,250.8	5,546.1	5,724.8	6,020.2	6,343.3	6,738.4	7,247.7	7,636.0	8,110.9	8,759.9
404 Current View of Curr. Year		N/A	N/A	4,288.6	4,539.9	4,900.4	5,250.8	5,546.1	5,724.8	6,020.2	6,343.3	6,831.4	7,265.4	7,861.6	8,300.8
SCB Table 6.2 Line 2															
412 Labor Compensation		N/A	2,524.0	2,698.8	2,921.5	3,100.4	3,287.8	3,405.0	3,591.3	3,780.6	4,004.8	4,209.4	4,428.5	4,690.3	5,016.4
414 Current View of Curr. Year		N/A	N/A	2,698.8	2,921.5	3,100.4	3,287.8	3,405.0	3,591.3	3,780.6	4,004.8	4,209.4	4,428.5	4,690.3	5,016.4
SCB Table 1.9 Line 6															
422 Depreciation		N/A	478.6	502.2	534.0	580.4	602.7	635.5	668.5	699.1	715.3	825.8	850.1	871.8	880.8
424 Current View of Curr. Year		N/A	N/A	478.6	502.2	534.0	602.7	635.5	668.5	699.1	715.3	825.8	850.1	871.8	880.8
SCB Table 1.9 Line 13															
432 Indirect Business Taxes		N/A	345.5	365.0	385.3	414.7	444.2	478.3	504.4	525.3	554.0	592.9	604.8	627.2	677.0
434 Current View of Curr. Year		N/A	N/A	345.5	385.3	414.7	444.2	478.3	504.4	525.3	554.0	592.9	604.8	627.2	677.0
SCB Table 6.18 Line 2															
442 Corporate FIT Liability		N/A	106.5	127.1	137.0	141.3	138.7	131.1	137.2	173.2	202.5	228.3	228.0	246.1	240.2
444 Current View of Curr. Year		N/A	N/A	106.5	137.0	141.3	138.7	131.1	137.2	173.2	202.5	228.3	228.0	246.1	240.2
SCB&B&E (note 2 below)															
452 Current Cost of Net Capital/Stock		7,751.80	8,224.3	8,728.1	9,108.3	9,650.3	10,116.5	10,384.8	10,781.2	11,280.9	11,917.2	12,415.4	16,496.7	17,316.3	18,565.3
454 Current View of Curr. Year		N/A	7,751.80	8,224.3	8,728.1	9,108.3	9,650.3	10,116.5	10,384.8	10,781.2	11,280.9	11,917.2	16,496.7	17,316.3	18,565.3
SCB&B&E (note 3 below)															
462 Constant Cost of Net Capital/Stock		8,112.40	8,349.0	8,557.9	8,773.8	8,990.3	9,157.8	9,261.5	9,373.8	9,562.6	9,825.1	9,999.3	14,540.0	14,944.0	15,302.0
464 Current View of Curr. Year		N/A	8,112.40	8,557.9	8,773.8	8,990.3	9,157.8	9,261.5	9,373.8	9,562.6	9,825.1	9,999.3	14,540.0	14,944.0	15,302.0
470 U.S. Capital Stock Price Index	14529.462	0.9585	0.9664	1.0200	1.0381	1.0746	1.1047	1.1213	1.1469	1.1807	1.2128	1.2416	1.1346	1.1587	1.1872
480 %Chg in U.S.Cap.Stk.Price Index	(0.4700)-(1.4700)(1)/1.4700(-1)	N/A	3.13%	3.51%	1.78%	3.51%	2.89%	1.50%	2.29%	2.95%	2.73%	2.37%	1.89%	2.11%	2.43%
480 Cost of Capital	(0.454)-(1.480)/1.454	N/A	13.93%	13.81%	12.35%	14.65%	13.81%	12.25%	13.13%	14.08%	13.90%	14.02%	11.89%	12.26%	13.66%

Capital Stock Price Index Link

1.1111

1.1348

1.1587

1989 Total Factor Productivity Review Plan
 Miscellaneous Inputs

Item	Source
ECONOMIC STOCK BOOK VALUE ADJUSTMENT FACTORS	
500 Gas Support Equipment	0.686915
510 Communications Equipment	0.667452
520 Structures	1.210756
DEPRECIATION RATES	
600 Noncommunications (Other) Equip	0.1546
610 Communications Equipment	0.1176
620 Structures	0.0225
OTHER MISCELLANEOUS INPUTS	
700 GSE Declining Balance Rate	2.0
710 GSE Asset Life	7.0
720 Comm/Equip Declining Balance Rate	2.0
730 Communications Equip. Asset Life	7.0
740 Cable & Wire Asset Life	31.5
STARTING INDEXES	
800 Local Price Index	as of 12/31/87
810 Interstate Access Price Index	1,0000
820 Toll Price Index	1,0000
830 End User Price Index	1,0000
840 Switched Access Price Index	1,0000
850 Special Access Price Index	1,0000
860 Miscellaneous Price Index	1,0000

Note 1: Special Access growth rate is based on a study of LEC special access revenues and quantities commissioned by USTA.

Note 2: Survey of Current Business (SCB), August 1994, p. 55, Table 2, line 1, and BEA Wealth Datasets released April 16, 1995 (described in January 1995 SCB).

Note 3: SCB, August 1994, p. 56, Table 4, line 1, and BEA Wealth Datasets released April 16, 1995 (described in January 1995 SCB).

Note 4: 1988 Current Cost and Book Cost data will be available in March 2000.
 Comments of the United States Telephone Association, FCC Dkt 94-1, May 9, 1994, Attachment 6 - Productivity of the Local Telephone Operating Companies, Laurits R. Christensen, Philip E. Schoech and Mark E. Melzer, pp 5-9

Note 5: Dale M. Jorgenson, "Productivity and Economic Growth" (Chapter 3) in "Fifty Years of Economic Measurement", ed. E. R. Brendt and J. E. Triplett, University of Chicago Press, 1990, Table 3-6, p. 45.

Note 6: BLS often restates indices from one year to another. In order to not achieve different results for historical runs each time this occurs, this model now includes (for each year) the BLS indices available at the time the study was run. When new indices are used, they will be input for the current year without restating historical indices. Values thru 1994 reflect indices available in 4Q95.

Note 7: U.S. Department of Labor, Bureau of Labor Statistics, "Multifactor Productivity-Private Business Sector", dated January or February of the year subsequent to the data year. Note that the U.S. TFP "Current View of Current Year" value in each column starting with 1984 is an estimate. Series ID: MDP740003.92=100. 1998 will be available in March 2000. To simplify data-gathering effort starting with data in the 1995 column, the index values (rather than the underlying MFP levels) are used.

1989 Total Factor Productivity Review Plan
Asset Price Development

Item	Source	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
BEA PRICE INDEXES																
100 Motor Vehicles	MISC11100															
110 Garage & Other Work Eqt	MISC11110															
120 Furniture & Office Eqt	MISC11120															
130 General Purpose Computers	MISC11130															
% CHANGE IN BEA PRICE INDEXES																
140 Motor Vehicles	MISC11106	N/A	4.75%	1.61%	3.34%	3.42%	1.12%	3.18%	4.38%	4.96%	3.15%	2.84%	0.62%	-0.62%	-1.02%	
150 Garage & Other Work Eqt	MISC11116	N/A	1.53%	1.01%	1.88%	1.94%	2.19%	1.98%	1.28%	0.91%	1.61%	0.22%	0.22%	-3.95%	-3.51%	
160 Furniture & Office Eqt	MISC11126	N/A	3.46%	3.05%	5.45%	3.54%	3.50%	1.84%	0.68%	1.71%	3.98%	0.20%	2.30%	1.89%	0.50%	
170 General Purpose Computers	MISC11136	N/A	-14.85%	-12.84%	-4.81%	-5.72%	-8.92%	-11.16%	-10.43%	-11.31%	-7.16%	-10.48%	-23.73%	-23.85%	-30.07%	
GROSS ADDITIONS																
200 Motor Vehicles	INV11100;85-87;MISC11300	280,587,000	280,587,000	280,587,000	286,537,000	287,619,000	276,415,000	269,925,000	205,703,000	193,336,000	184,027,000	200,387,000	196,178,000	250,915,000	334,880,000	
210 Garage & Other Work Eqt	INV11110;120;85-87;MISC1131	194,104,000	194,104,000	194,104,000	189,486,000	174,456,000	195,194,000	180,811,000	205,262,000	180,569,000	178,683,000	163,483,000	332,127,000	250,611,000	205,181,000	
220 Furniture & Office Eqt	INV11140;150;85-87;MISC1132	584,486,000	584,486,000	584,486,000	572,488,000	368,722,000	421,231,000	284,441,000	255,519,959	237,151,000	247,680,000	223,982,000	189,838,000	161,251,000	133,451,000	
230 General Purpose Computers	INV11160;85-87;MISC11330	1,110,021,000	1,110,021,000	1,110,021,000	1,099,011,000	1,251,509,000	1,210,606,000	1,260,804,000	1,381,389,000	1,337,134,000	1,484,842,000	1,806,271,000	1,381,581,000	1,159,809,000	947,358,000	
240 Total	Sum of 200 thru 230	2,169,178,000	2,169,178,000	2,169,178,000	2,128,502,000	2,082,346,000	2,103,446,000	2,005,781,000	2,047,873,989	1,948,180,000	2,074,612,000	2,186,123,000	2,079,734,000	1,822,598,000	1,620,870,000	
GROSS ADDITIONS: AVERAGE OF SHARES																
250 Motor Vehicles	(.200)(-1)(.240)(-1)(.200)(.240)(.0)	N/A	12.84%	12.84%	12.73%	13.17%	13.48%	13.30%	11.75%	9.98%	9.40%	9.00%	9.29%	11.86%	17.21%	
260 Garage & Other Work Eqt	(.210)(-1)(.240)(-1)(.210)(.240)(.0)	N/A	8.85%	8.85%	8.81%	8.87%	8.83%	8.83%	9.76%	9.65%	8.94%	8.03%	11.71%	14.86%	13.20%	
270 Furniture & Office Eqt	(.220)(-1)(.240)(-1)(.220)(.240)(.0)	N/A	26.84%	26.84%	26.83%	22.31%	18.87%	17.35%	13.56%	12.33%	12.04%	11.05%	9.66%	8.99%	8.54%	
280 General Purpose Computers	(.230)(-1)(.240)(-1)(.230)(.240)(.0)	N/A	51.17%	51.17%	51.43%	55.89%	59.83%	59.98%	64.91%	68.04%	69.62%	71.92%	69.35%	64.55%	61.04%	
300 % Change: GSE Price Index	1407250+160+280+160+270+170+2	N/A	-5.61%	-5.45%	-0.41%	-1.79%	-4.19%	-5.76%	-0.04%	-6.96%	-4.07%	-6.86%	-16.46%	-15.76%	-18.95%	
310 General Support Index	1310(-1)@exp(3.000)	1,1250	1,0804	1,0042	1,0000	0.9823	0.9420	0.8682	0.8371	0.7808	0.7497	0.6993	0.5933	0.5067	0.4182	
Communications Equipment																
330 % Change: Comm. Eqt. Index	MISC11148	N/A	2.07%	2.53%	-0.40%	1.30%	1.18%	1.55%	1.34%	1.69%	1.17%	1.24%	1.50%	0.64%	1.63%	
340 Communication Equipment Index	(.340)(-1)@exp(0.3300)	0.9568	0.9789	1.0040	1.0000	1.0131	1.0251	1.0412	1.0552	1.0723	1.0843	1.0978	1.0814	1.0745	1.0371	
Telecommunications Structures																
360 % Chg: Telecom Structures Index	MISC11156	N/A	-1.00%	0.00%	1.00%	8.54%	2.69%	0.88%	0.00%	0.87%	3.08%	0.77%	3.03%	-3.08%	0.00%	
370 Telecom Structures Index	(.370)(-1)@exp(0.3600)	1,0000	0.9901	0.9901	1,0000	1,0891	1,1188	1,1287	1,1287	1,1386	1,1743	1,1834	1,2188	1,1828	1,1828	

1988 Total Factor Productivity Review Plan
 Capital Stock Beginning Value

Item	Source	1987
GROSS BOOK VALUES		
100 Gen Support Equipment	OTH1:1,100 to 1,120 + 1,140 to 1,160	13,088,552,000
110 Communication Equipment	OTH1:1,170 to 1,200	85,989,494,000
120 Structures	OTH1:1,130 to 1,210	84,086,423,000
STARTING CAPITAL STOCK VALUES		
200 Gen Support Equipment	1,100/MISC:1,1500	7,857,646,560
210 Communication Equipment	1,110/MISC:1,1510	60,041,321,760
220 Structures	1,120/MISC:1,1520	113,815,707,220
230 Total		181,714,675,540
STARTING CAPITAL STOCK QUANTITIES		
300 Gen Support Equipment	1,200/ASTPRICE:1,1310	7,825,948,678
310 Communication Equipment	1,210/ASTPRICE:1,1340	59,894,185,471
320 Structures	1,220/ASTPRICE:1,1370	115,054,884,292

1999 Total Factor Productivity Review Plan
Development of Capital Index, Part 1: Capital Stock Calculations

Item	Source	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
GROSS ADDITIONS												
100 Gen Support Equipment	INW1, Sum of 1100 thru 11	2,126,502,000	2,082,346,000	2,103,446,000	2,005,781,000	2,047,873,989	1,948,180,000	2,074,612,000	2,186,123,000	2,076,734,000	1,822,598,000	1,620,670,000
110 Communication Equipment	INW1, Sum of 1170 thru 12	8,987,050,000	7,896,144,000	8,407,752,000	8,464,989,000	8,891,289,000	9,152,741,000	9,357,228,000	9,392,722,845	11,659,791,000	12,240,115,000	13,157,569,000
120 Structures	INW1, Sum of 1130 + 1210	5,684,310,000	5,739,305,000	6,788,671,000	6,619,752,000	6,862,955,000	6,444,270,000	6,048,668,000	6,370,580,000	7,072,188,000	7,450,840,000	7,409,608,000
130 Total	Sum of 100 thru 120	16,797,862,000	15,707,795,000	17,299,869,000	17,090,532,000	17,802,117,989	17,545,191,000	17,480,938,000	17,929,425,845	20,811,713,000	21,513,553,000	22,187,847,000
ASSET PRICE INDEXES												
200 Gen Support Equipment	ASTPRC1, 1310	1.0000	0.9623	0.9420	0.8892	0.8371	0.7808	0.7497	0.6993	0.5933	0.5067	0.4182
210 Communication Equipment	ASTPRC1, 1340	1.0000	1.0131	1.0251	1.0412	1.0552	1.0723	1.0843	1.0978	1.0814	1.0745	1.0571
220 Structures	ASTPRC1, 1370	1.0000	1.0891	1.1188	1.1287	1.1287	1.1386	1.1743	1.1834	1.2198	1.1828	1.1828
CONSTANT DOLLAR INVESTMENT												
300 Gen Support Equipment	I:100K:200	2,126,502,000	2,119,973,232	2,232,987,223	2,255,658,670	2,446,304,883	2,485,006,496	2,767,257,387	3,140,329,751	3,506,586,489	3,587,280,186	3,866,701,979
310 Communication Equipment	I:110K:210	8,987,050,000	7,784,538,577	8,201,881,481	8,130,317,265	8,425,997,949	8,535,702,281	8,629,443,600	8,528,322,229	10,781,715,744	11,391,373,952	12,448,318,871
320 Structures	I:120K:220	5,684,310,000	5,269,725,500	6,067,750,186	5,864,868,000	5,903,144,342	5,659,750,174	5,151,083,457	5,383,393,490	5,797,738,659	6,289,501,839	6,264,841,198
CAPITAL STOCK QUANTITY												
400 Gen Support Equipment	I:400K:1Y1(-)MISC11,600)	8,573,478,928	9,387,892,318	10,152,887,928	10,838,741,044	11,609,378,561	12,309,573,441	13,173,770,774	14,277,435,563	15,575,730,515	16,785,002,763	18,039,835,315
410 Communication Equipment	I:410K:1Y1(-)MISC11,610)	62,210,079,261	63,151,509,119	64,406,724,587	65,452,302,156	66,676,546,868	67,879,608,993	69,042,995,604	69,975,965,316	73,060,324,875	76,415,083,091	80,455,725,822
420 Structures	I:420K:1Y1(-)MISC11,620)	118,150,439,845	120,761,780,449	124,112,390,574	127,184,729,787	130,228,217,708	132,855,877,884	135,115,454,186	137,458,749,957	140,163,666,741	143,309,486,079	146,349,663,840
CAPITAL STOCK VALUE												
500 Gen Support Equipment	I:2001:400	8,573,478,928	9,201,720,585	9,563,704,886	9,638,045,482	9,718,551,671	9,611,704,348	9,876,371,841	9,984,621,715	9,240,501,247	8,494,156,398	7,562,058,835
510 Communication Equipment	I:2101:410	62,210,079,261	63,975,775,804	66,023,359,250	66,146,823,831	70,360,595,139	72,786,568,679	74,865,139,811	76,822,328,178	79,010,441,259	82,108,546,665	85,052,103,818
520 Structures	I:2201:420	118,150,439,845	131,522,731,182	138,858,417,177	143,555,041,541	146,988,008,107	151,385,405,825	158,680,525,411	162,665,420,050	170,874,212,591	169,501,665,130	173,097,485,685
530 Total	Sum of 500 thru 520	188,933,988,034	204,700,227,571	214,445,481,314	221,339,710,855	227,067,154,916	233,783,678,853	243,401,837,063	249,472,369,943	259,225,155,086	260,104,368,214	265,711,646,318
Lagged Capital Stock Value												
600 Gen Support Equipment	I:2000Y1:400(-)1	7,625,948,578	8,421,308,949	8,824,531,448	9,027,892,054	9,073,429,941	9,064,968,474	9,228,483,370	9,212,797,155	8,470,271,170	7,891,599,714	7,027,665,989
610 Communication Equipment	I:2100Y1:410(-)1	59,801,156,473	63,022,058,207	64,736,637,360	67,058,005,429	69,086,936,111	71,488,662,786	73,604,365,294	75,797,309,363	75,874,887,931	76,503,855,826	80,760,600,919
620 Structures	I:2200Y1:420(-)1	115,054,884,282	128,978,696,861	135,109,714,759	140,987,252,728	143,555,041,541	148,277,376,599	156,124,427,019	159,892,419,488	167,874,705,484	165,780,895,274	169,501,665,130
630 Total	Sum of 600 thru 620	182,481,969,343	200,122,064,017	208,670,883,567	216,173,250,210	221,695,107,593	228,841,027,859	238,957,305,682	244,902,526,007	251,176,350,814	252,176,350,814	257,309,932,048

Item	Source	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
1998 Total Factor Productivity Review Plan Development of Capital Index, Part 2: Capital Cost Development												
VALUE OF REPLACEMENT												
700 Gen Support Equipment	MISC1(1,600)CAP(1,600)	1,178,971,650	1,301,834,363	1,364,272,562	1,395,727,572	1,402,752,269	1,401,444,126	1,426,723,529	1,424,296,440	1,309,503,923	1,220,041,316	1,086,477,163
710 Communication Equipment	MISC1(1,510)CAP(1,610)	6,578,127,212	6,932,426,403	7,121,030,110	7,376,380,597	7,597,329,972	7,864,855,106	8,096,483,482	8,337,704,030	8,324,237,672	8,635,424,141	8,885,686,101
720 Structures	MISC1(1,620)CAP(1,620)	2,588,734,447	2,895,271,679	3,039,988,562	3,151,863,186	3,229,988,435	3,336,241,973	3,517,989,608	3,597,579,438	3,772,680,873	3,730,070,144	3,813,787,465
730 Total	Sum of 700 thru 720	10,345,833,309	11,129,631,446	11,525,271,254	11,924,071,355	12,230,070,676	12,602,540,206	13,038,006,619	13,359,581,908	13,408,422,468	13,565,535,600	13,786,130,730
THREE YEAR MOVING AVERAGE FOR CAPITAL GAINS												
800 Gen Support Equipment	ASTPRC1(1,310)(1,310)(-)	-0.041656	-0.028054	-0.020723	-0.036925	-0.046374	-0.053719	-0.046507	-0.045834	-0.062523	-0.081013	-0.093381
810 Communication Equipment	ASTPRC1(1,340)(1,340)(-)	0.013722	0.011379	0.007028	0.013722	0.014056	0.015730	0.014381	0.014206	0.003051	-0.003277	-0.013570
820 Structures	ASTPRC1(1,370)(1,370)(-)	0.000000	0.033003	0.042904	0.042904	0.013201	0.006901	0.015182	0.018221	0.027068	0.002636	-0.000203
CAPITAL GAINS												
900 Gen Support Equipment	I,400(-1,1,800)(1)	(317,662,735)	(223,369,508)	(194,133,274)	(374,898,625)	(524,311,724)	(623,639,621)	(572,486,145)	(605,118,357)	(692,667,362)	(1,261,840,188)	(1,565,527,691)
910 Communication Equipment	I,410(-1,1,800)(1)	820,564,731	707,879,081	443,835,907	883,760,277	920,012,279	1,048,825,671	978,848,456	980,812,398	213,473,033	(239,394,398)	(1,038,939,465)
920 Structures	I,420(-1,1,820)(1)	0	3,899,354,450	5,181,188,501	5,324,854,051	1,678,006,334	859,578,995	2,018,472,075	2,481,955,746	3,720,755,798	397,556,261	(29,125,687)
930 Total	Sum of 900 thru 920	502,901,986	4,383,864,024	5,430,901,134	5,833,815,703	2,074,708,880	1,284,765,245	2,422,834,386	2,837,649,787	3,041,561,439	(1,103,678,335)	(2,651,562,863)
TAXES												
1000 Direct Income Taxes	EXP1(1,210)(1,220)	5,251,305,000	4,501,651,000	5,056,660,000	5,492,475,000	5,673,475,000	6,405,837,000	6,442,269,000	6,135,749,000	7,069,736,000	6,739,713,000	7,769,928,000
1010 Property & Capital Stock Tax	EXP1(1,230)(1,250)	2,402,488,793	2,556,590,082	2,840,311,225	2,843,395,416	2,867,806,000	2,585,934,000	2,572,298,000	2,501,518,000	2,604,558,000	2,516,700,000	2,535,159,000
1020 Net Investment Tax Credits	EXP1(1,200)	865,968,326	803,998,000	725,102,000	685,933,000	603,261,000	554,943,000	488,464,000	381,893,000	351,000,000	286,801,000	236,970,000
1100 Investment Tax Credit Rate	I,1020(1,130)	0.0516	0.0512	0.0419	0.0390	0.0343	0.0316	0.0278	0.0213	0.0169	0.0133	0.0107
1110 Property/Capital Stock Tax	I,1010(1,530)(-1)	0.0132	0.0135	0.0129	0.0123	0.0116	0.0114	0.0110	0.0103	0.0104	0.0097	0.0097
1120 Cost of Capital	MISC1(1,490)	0.1235	0.1465	0.1381	0.1222	0.1313	0.1406	0.1390	0.1402	0.1189	0.1226	0.1366
1130 Three Year Moving Average	MISC1(1,490)(-2)(1,490)(-1)	0.1326	0.1360	0.1360	0.1356	0.1305	0.1314	0.1370	0.1399	0.1327	0.1272	0.1260
PRESENT VALUE OF DEPRECIATION												
1140 GSE Decl Balance Rate/Ass	MISC1(1,700)(1,0)	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857
1150 Comm/Eq Decl Bal Rate/Ass	MISC1(1,720)(730)	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857	0.2857
1160 Gen Support Equipment	(1,1140)*(1,1140)/(1+1,1130)^3+ (1-1,1140)/(1+1,1130)^3*	0.6972	0.6917	0.6916	0.6923	0.7006	0.6992	0.6901	0.6653	0.6971	0.7061	0.7082
1170 Central Office	(1,1150)*(1,1130)/(1+1,1130)^3+ (1-1,1150)/(1+1,1130)^3*	0.6972	0.6917	0.6916	0.6923	0.7006	0.6992	0.6901	0.6653	0.6971	0.7061	0.7082
1180 Cable & Wire	(1,1130)*(1,1130)/(1+1,1130)^3+ (1-1,1130)/(1+1,1130)^3*	0.2347	0.2292	0.2292	0.2299	0.2381	0.2367	0.2277	0.2232	0.2345	0.2438	0.2459
1190 Capital Cost	I,1130*CAPSTK(1,230)(1,1 1,1010)(1,730)(930	41,577,504,497	39,488,529,492	41,635,212,875	43,301,405,331	47,290,079,323	50,140,800,714	51,654,853,142	53,219,149,521	53,161,321,271	56,926,799,329	59,507,716,450

Item	Source	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
1988 Total Factor Productivity Review Plan Development of Capital Index, Part 3, Capital Input Index												
PROPERTY/CAPITAL STOCK TAXES												
1200 Gen Support Equipment	L11100(1)500(-1)	101,289,138	116,013,377	116,687,734	117,888,488	111,812,882	110,678,857	105,756,604	101,502,611	104,242,111	89,711,855	82,789,896
1210 Communication Equipment	L11100(1)510(-1)	794,256,313	841,805,463	825,186,862	813,847,156	780,562,534	801,295,349	800,863,200	769,412,824	802,045,571	767,076,704	800,287,294
1220 Structures	L11100(1)520(-1)	1,506,933,342	1,598,771,242	1,696,436,529	1,711,659,771	1,665,410,583	1,673,958,794	1,665,678,196	1,630,802,565	1,698,270,318	1,659,911,441	1,652,081,719
IMPUTED TAX DEPRECIATION												
1300 Gen Support Equipment	L11607(1)1301500(-1)H	1,751,416,803	1,881,457,188	1,943,477,726	2,123,605,652	2,231,609,802	2,308,768,123	2,288,184,320	2,337,998,574	2,468,564,338	2,562,777,870	2,636,196,579
1310 Communication Equipment	L11707(1)1301510(-1)H	9,864,981,002	10,157,040,181	10,636,530,428	10,692,843,134	10,910,789,173	11,229,458,417	11,793,673,754	12,221,651,389	12,759,249,897	13,365,513,857	14,355,755,068
1320 Structures	L11807(1)1301520(-1)H	4,152,296,369	3,453,073,918	3,609,398,483	3,828,856,132	4,831,035,202	5,156,817,634	5,061,887,538	5,208,939,034	5,074,182,557	6,115,349,088	6,197,990,094
1330 Total	Sum of 1300 thru 1320	15,468,694,274	15,471,571,288	16,189,376,607	16,644,605,918	17,973,434,177	18,695,145,174	18,143,745,612	19,768,589,007	20,291,986,892	22,083,640,815	23,189,941,741
1350 Effective Income Tax Rate	(L11007(1)1301530(-1)H, L11000(1)1190-1,1010(-1,1330))	0.2953	0.2870	0.2842	0.2858	0.2821	0.2671	0.2548	0.2289	0.2585	0.2280	0.2456
SERVICE FLOWS												
1400 Gen Support Equipment	(L11100H,1350(1)1600(1) (L11301500(-1)H,700(1)900(-1)1300)	2,748,227,809	2,948,115,125	3,108,117,293	3,395,467,460	3,487,843,548	3,631,920,954	3,648,333,508	3,737,417,079	3,923,482,162	4,001,532,170	4,106,356,682
1410 Communication Equipment	(L11100H,1350(1)1700(1) (L11301510(-1)H,710(1)910(1)1210)	15,249,878,214	16,295,167,179	17,188,145,482	17,316,895,046	17,296,675,490	17,928,024,030	19,065,034,297	19,775,788,467	20,622,815,712	21,010,199,137	22,711,148,744
1420 Structures	(L11100H,1350(1)1800(1) (L11301520(-1)H,720(-1)920(1)1220)	23,578,798,673	20,255,247,188	21,340,950,100	22,589,042,825	28,505,580,286	28,580,855,730	28,940,485,337	29,705,943,975	28,615,023,396	31,915,068,022	32,890,211,024
CAPITAL INPUT QUANTITIES												
1500 Gen Support Equipment	L400(1)1CAPSTK(1)1,300	1,0000	1,1243	1,2284	1,3313	1,4213	1,5224	1,6142	1,7275	1,8722	2,0425	2,1884
1510 Communication Equipment	L410(1)1CAPSTK(1)1,310	1,0000	1,0403	1,0560	1,0770	1,0845	1,1150	1,1381	1,1545	1,1701	1,2217	1,2778
1520 Structures	L420(1)1CAPSTK(1)1,320	1,0000	1,0268	1,0498	1,0787	1,1054	1,1319	1,1556	1,1744	1,1947	1,2182	1,2456
CAPITAL INPUT SHARES												
1600 Gen Support Equipment	L1400(1)190	0.0661	0.0746	0.0747	0.0784	0.0738	0.0724	0.0706	0.0702	0.0738	0.0703	0.0690
1610 Communication Equipment	L1410(1)190	0.3668	0.4126	0.4128	0.3989	0.3658	0.3576	0.3681	0.3716	0.3879	0.3691	0.3817
1620 Structures	L1420(1)190	0.5871	0.5128	0.5126	0.5217	0.5605	0.5700	0.5603	0.5582	0.5383	0.5606	0.5493
AVERAGE OF CAPITAL INPUT SHARES												
1700 Gen Support Equipment	(L1600(-1)H,1600(1)2	N/A	0.0704	0.0746	0.0763	0.0761	0.0731	0.0715	0.0704	0.0720	0.0720	0.0696
1710 Communication Equipment	(L1610(-1)H,1610(1)2	N/A	0.3897	0.4127	0.4063	0.3828	0.3617	0.3633	0.3703	0.3798	0.3765	0.3754
1720 Structures	(L1620(-1)H,1620(1)2	N/A	0.5400	0.5127	0.5171	0.5411	0.5653	0.5651	0.5592	0.5482	0.5495	0.5650
CAPITAL INPUT GROWTH RATES												
1800 Gen Support Equipment	@ln(L1500(1)1500(-1))	N/A	11.71%	8.86%	8.04%	6.54%	6.87%	5.86%	6.8%	8.0%	8.7%	7.4%
1810 Communication Equipment	@ln(L1510(1)1510(-1))	N/A	3.95%	1.50%	1.97%	1.61%	1.86%	1.79%	1.7%	1.3%	4.3%	4.5%
1820 Structures	@ln(L1520(1)1520(-1))	N/A	2.85%	2.19%	2.74%	2.45%	2.36%	2.07%	1.6%	1.7%	1.9%	2.2%
1850 AGGREGATE CAPITAL INP GROWTH RATE	1700*1800+1710*1810+1	N/A	3.80%	2.40%	2.83%	2.44%	2.51%	2.24%	2.0%	2.0%	3.3%	3.4%

1998 Total Factor Productivity Review Plan
 Labor and MR&S Input Index Development

Item	Source	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
LABOR INPUT INDEX DEVELOPMENT												
100 Wages and Salaries	EXP1:1:120	17,702,530,000	17,666,806,000	17,878,655,000	17,738,490,000	17,663,812,000	17,802,446,000	17,596,539,000	17,640,465,000	17,815,572,000	17,833,843,000	18,015,245,000
110 Fringe Benefits	EXP1:1:130	4,201,210,000	4,278,693,000	4,360,014,000	5,108,748,000	5,322,768,000	6,625,305,000	7,182,369,000	6,356,310,000	5,563,285,000	4,663,912,000	4,559,470,000
120 Labor Input Cost	Sum of 100 + 110	21,903,740,000	21,945,499,000	22,238,672,000	22,847,238,000	22,986,580,000	24,427,751,000	24,778,908,000	23,996,775,000	23,378,857,000	22,497,755,000	22,574,715,000
200 End of Year Work Force	EXP:1:300	574,312	568,826	537,774	514,318	488,880	470,509	436,229	409,083	401,322	400,909	402,558
210 Average Work Force	(L200(t-1)+200(t))/2	581,039	571,619	555,350	528,046	501,589	479,695	453,369	422,666	405,203	401,116	401,734
220 % Change in Labor Input	@[(L210(t)/M.210(t-1))]	N/A	-1.65%	-3.25%	-5.06%	-4.76%	-4.47%	-5.64%	-7.01%	-4.22%	-1.01%	0.15%

MR&S INPUT INDEX DEVELOPMENT

300 Total Operating Expenses	EXP1:1:100	55,170,276,000	57,432,289,000	58,447,640,000	59,988,374,000	59,642,816,000	62,226,713,000	65,565,061,000	66,952,522,000	67,951,756,000	68,788,998,000	71,648,427,000
310 Depreciation & Amortization	EXP1:1:110	16,021,903,000	16,286,221,000	16,427,540,000	16,013,519,000	16,356,265,000	16,885,243,000	17,743,325,000	18,446,323,000	19,481,214,000	19,987,384,000	20,678,381,000
320 Wages and Salaries	EXP1:1:120	17,702,530,000	17,666,806,000	17,878,655,000	17,738,490,000	17,663,812,000	17,802,446,000	17,596,539,000	17,640,465,000	17,815,572,000	17,833,843,000	18,015,245,000
330 Fringe Benefits	EXP1:1:130	4,201,210,000	4,278,693,000	4,360,014,000	5,108,748,000	5,322,768,000	6,625,305,000	7,182,369,000	6,356,310,000	5,563,285,000	4,663,912,000	4,559,470,000
340 MR&S Input Cost	I:300-I:310-I:320-I:330	17,244,635,000	19,200,549,000	19,781,428,000	21,105,617,000	20,297,981,000	20,913,719,000	23,042,828,000	24,509,424,000	25,091,687,000	27,313,859,000	28,395,331,000
350 % Change in MR&S Cost	@[(I:340(t)/M.340(t-1))]	N/A	10.74%	2.98%	6.48%	-3.90%	2.99%	9.69%	6.17%	2.35%	8.48%	3.88%
GDPPPI												
380 % Change in GDPPPI (annual)	MISC1:1:207	N/A	4.40%	4.43%	3.95%	3.13%	2.63%	2.69%	2.49%	2.25%	1.64%	1.17%
390 % Change in MR&S Quantity	I:350-I:380	N/A	6.34%	-1.45%	2.53%	-7.03%	0.06%	7.00%	3.68%	0.10%	6.64%	2.71%

1988 Total Factor Productivity Review Plan
 Index of Total Input

Item	Source	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1988
INPUT COSTS												
100 Capital	CAP11.1190	41,577,904,497	38,468,529,492	41,635,212,875	43,301,405,331	47,290,079,323	50,140,800,714	51,654,853,142	53,219,149,521	53,161,321,271	56,926,799,329	59,507,716,450
110 Labor	LABMRS11.120	21,803,740,000	21,945,499,000	22,238,672,000	22,847,238,000	22,886,580,000	24,427,751,000	24,778,908,000	23,996,775,000	23,378,857,000	22,487,755,000	22,574,715,000
120 MR&S	LABMRS11.340	17,244,635,000	19,200,549,000	19,781,428,000	21,105,617,000	20,297,981,000	20,913,719,000	23,042,828,000	24,509,424,000	25,091,687,000	27,313,659,000	28,395,331,000
130 Total Input Cost	Sum of 100 thru 120	80,726,279,497	80,644,577,492	83,655,312,875	87,254,260,331	90,574,640,323	95,462,270,714	99,476,589,142	101,725,346,521	101,631,865,271	106,738,413,329	110,477,762,450
AVERAGE OF SHARES												
200 Capital	I1.100(I-1)I1.130(I-1)I4.100(I	N/A	50.24%	48.37%	49.70%	50.92%	52.36%	52.22%	52.12%	52.31%	52.82%	53.60%
210 Labor	I1.110(I-1)I1.130(I-1)I4.110(I	N/A	27.17%	26.90%	26.38%	25.78%	25.48%	25.25%	24.25%	23.30%	22.04%	20.78%
220 MR&S	I1.120(I-1)I1.130(I-1)I4.120(I	N/A	22.59%	23.73%	23.92%	23.30%	22.16%	22.53%	23.63%	24.39%	25.14%	25.65%
INPUT QUANTITY GROWTH												
300 Capital	CAP11.11850	N/A	3.80%	2.40%	2.63%	2.44%	2.51%	2.24%	2.01%	2.03%	3.33%	3.43%
310 Labor	LABMRS11.1220	N/A	-1.63%	-3.25%	-5.06%	-4.76%	-4.47%	-5.64%	-7.01%	-4.22%	-1.01%	0.15%
320 MR&S	LABMRS11.390	N/A	6.34%	-1.45%	2.53%	-7.03%	0.06%	7.00%	3.68%	0.10%	6.64%	2.71%
350 TOTAL INPUT GROWTH	I.200*1.300+1.210*1.310+1.2	N/A	2.90%	-0.03%	0.68%	-1.62%	0.19%	1.32%	0.21%	0.10%	3.21%	2.56%

1998 Total Factor Productivity Review Plan
Price Index Development

Item	Source	1988	1989	1990	1991	1992	1993	1994	1995	1998	1997	1998
SWITCHED PRICE INDEX												
500 Booked Revenue	OUTIDX1.140	11,617,855,000	10,985,805,000	10,425,760,000	10,358,581,000	10,512,891,000	10,761,821,000	11,182,374,000	11,255,672,000	11,454,390,000	10,785,569,000	9,231,017,000
510 % Change in Switched Re	@hl(500)(M.500)(-1))	N/A	-5.50%	-5.32%	-0.65%	1.46%	2.34%	3.84%	0.65%	1.75%	-5.92%	-15.68%
520 Carrier Common Line Reven	REV11.200-REV11.130	4,381,666,000	3,307,217,000	2,839,767,000	2,524,942,000	2,408,260,000	2,799,083,000	3,223,457,000	3,257,166,000	3,206,487,000	3,018,232,000	3,387,163,000
530 Traffic Sensitive Revenue	REV11.210	7,239,420,000	7,666,493,000	7,407,610,000	7,485,438,000	7,794,244,000	7,770,380,000	7,721,726,000	7,942,338,000	8,155,821,000	7,684,205,000	5,741,215,000
540 Total Revenue	I520+I530	11,621,006,000	10,975,710,000	10,247,377,000	10,010,380,000	10,202,504,000	10,569,463,000	10,945,183,000	11,189,504,000	11,361,906,000	10,712,437,000	9,128,376,000
550 Avg Ccr Cmn Line Revenue	(I520(-1)/I540(-1))+I520(I	N/A	0.3392	0.2852	0.2847	0.2441	0.2504	0.2797	0.2927	0.2865	0.2820	0.3264
560 Avg Traffic Sensitive Revenue	(I530(-1)/I540(-1))+I530(I	N/A	0.6608	0.7108	0.7353	0.7559	0.7486	0.7203	0.7073	0.7133	0.7180	0.6736
570 Common Line MOU	DMD1.Sum of I1,110 thru I1	220,143,835,000	249,196,732,000	273,805,170,000	289,332,012,000	309,439,932,230	331,263,940,839	355,129,291,000	383,576,023,000	415,450,747,000	442,805,036,000	462,558,066,000
580 % Change in Common Line		N/A	12.40%	9.42%	5.52%	6.72%	6.82%	6.96%	7.71%	7.98%	6.38%	4.86%
590 Traffic Sensitive MOU	DMD1.I.150	239,691,396,000	265,468,154,000	283,835,482,000	297,438,355,000	324,311,554,000	333,356,172,250	381,402,276,000	389,786,018,000	421,895,031,000	451,426,381,000	470,254,288,000
600 % Change in Traffic Sensitive	@hl(590)(M.590)(-1))	N/A	10.21%	6.69%	4.88%	8.85%	2.75%	8.08%	7.56%	7.92%	6.77%	4.09%
610 % Chg in Switched Quantity	I1550+I580+I560+I600	N/A	10.95%	7.48%	4.90%	8.18%	3.77%	7.76%	7.60%	7.93%	6.66%	4.18%
620 % Change in Switched Price	I510+I610	N/A	-16.46%	-12.80%	-5.55%	-6.70%	-1.43%	-3.93%	-8.95%	-6.18%	-12.59%	-18.83%
630 Switched Price Index	(I630(-1)*@expt(620(0))	1.0000	0.8483	0.7463	0.7060	0.6603	0.6509	0.6258	0.5838	0.5488	0.4839	0.3989
SPECIAL PRICE INDEX												
700 Agg Special Access/Trunking	MISC1:(Sum 220to250(0)+	N/A	N/A	N/A	86,4586	86,0842	91,9870	86,6450	82,9565	80,4503	71,1416	59,5958
710 % Change in Special Price	@hl(700)(M.700)(-1))	N/A	-7.94%	-1.08%	2.57%	-0.37%	-6.45%	-5.85%	-4.35%	-3.07%	-12.30%	-17.71%
720 Special Price Index	I720(-1)*@expt(710(0))	1.0000	0.9237	0.9139	0.9377	0.9342	0.8759	0.8252	0.7901	0.7682	0.6775	0.5676
MISCELLANEOUS PRICE INDEX												
810 % Change in GDPPI (annual)	MISC1:1.207	N/A	4.40%	4.43%	3.95%	3.13%	2.93%	2.69%	2.49%	2.25%	1.84%	1.17%
820 Miscellaneous Price Index	I820(-1)*@expt(810(0))	1.0000	1.0450	1.0924	1.1364	1.1724	1.2073	1.2403	1.2716	1.3005	1.3247	1.3403

1998 Total Factor Productivity Review Plan
 Total Factor Productivity Development

Item	Source	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
100 Total Output Growth	OUTIDX3,1300	N/A	4.67%	3.82%	2.69%	2.18%	3.86%	3.55%	4.02%	6.34%	4.26%	6.06%
110 Total Input Growth	INPIDX1,1350	N/A	2.90%	-0.03%	0.68%	-1.62%	0.19%	1.32%	0.21%	0.10%	3.21%	2.56%
120 LEC Total Factor Productivt	1,100-1,110	N/A	1.77%	3.85%	2.02%	3.78%	3.47%	2.33%	3.80%	6.23%	1.06%	3.50%
U.S. TFP												
131 Growth: Year (t) over Year (t-1)	MISC1,1,265	N/A	-0.26%	-0.21%	-1.04%	1.49%	0.62%	0.60%	0.39%	0.99%	0.69%	0.68%
132 Growth: Year (t-1) over Year (t-2)	MISC1,1,262	N/A	N/A	-0.26%	-0.21%	-1.04%	1.49%	0.62%	0.79%	-0.30%	0.99%	0.69%
133 Growth: Year (t-2) over Year (t-3)	MISC1,1,265	N/A	N/A	N/A	-0.26%	-0.21%	-1.04%	1.49%	0.50%	0.40%	-0.30%	0.99%
134 Growth: Year (t-3) over Year (t-4)	MISC1,1,264	N/A	N/A	N/A	N/A	-0.26%	-0.21%	-1.04%	1.40%	0.20%	0.40%	-0.30%
135 Growth: Year (t-4) over Year (t-5)	MISC1,1,265	N/A	N/A	N/A	N/A	N/A	-0.26%	-0.21%	-1.00%	1.92%	0.20%	0.40%
140 TFP Differential	1,120-1,131	N/A	2.03%	4.07%	3.06%	2.29%	2.85%	1.73%	3.41%	5.24%	0.37%	2.81%
150 5 Year Rolling Avg LEC TFP	[Sum of 1,120(t-4) thru 1,112]	N/A	N/A	N/A	N/A	N/A	2.98%	3.09%	3.08%	3.92%	3.36%	3.38%
160 5 Year Rolling Avg US TFP	[Sum of 1,131 thru 1,135]/5	N/A	N/A	N/A	N/A	N/A	0.12%	0.29%	0.42%	0.64%	0.40%	0.46%
170 5 Year Rolling Avg TFP Diff	1,160-1,150	N/A	N/A	N/A	N/A	N/A	2.86%	2.80%	2.66%	3.26%	2.96%	2.89%

ATTACHMENT 4

**USTA COMMENTS
CC DOCKET NO. 94-1, 96-262
JANUARY 24, 2000**

Table 4
Local Output
(Growth Rates)

Year	Local Calls	Local DEMs	Access Lines
1986	1.7%	1.1%	2.9%
1987	1.6	0.6	3.0
1988	-0.6	4.6	0.0
1989	3.6	1.8	3.0
1990	3.7	1.2	2.6
1991	3.2	-0.1	3.4
1992	3.5	3.0	1.4
1993	3.2	5.3	3.0
1994	4.1	4.8	2.7
1995	4.3	4.8	4.0
1996	3.1	8.5	4.5
1997	2.6	11.5	4.9
1998	2.6	4.4	3.6
1991-98	3.3	6.0	3.4
1994-98	3.3	6.8	3.9
