

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

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FEDERAL COMMUNICATIONS COMMISSION
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ORIGINAL

In the Matter of)

Access Charge Reform)

Price Cap Performance Review for)
Local Exchange Carriers)

Request for Amendment of the Commission's)
Rules Regarding Access Charges Reform and)
Price Cap Performance Review for Local)
Exchange Carriers)

CC Docket No. 96-262 ✓

CC Docket No. 94-1

RM No. 9210

**REPLY COMMENTS OF AT&T CORP. TO
UPDATE AND REFRESH THE RECORD**

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SUMMARY

The comments abundantly confirm that the Commission should immediately grant the CFA Petition and adopt prescriptive mechanisms to drive access charges to cost as soon as possible. As the commenters show, competition robust enough to put competitive pressure on access charges does not exist, and is not likely to exist in the foreseeable future. Indeed, the commenters show that meaningful competition has been precluded by several factors, including Eighth Circuit decisions that have dealt a crippling blow to UNE-based competition; the failure of ILECs to provide either nondiscriminatory OSS interfaces that could support substantial competition or nondiscriminatory collocation arrangements; and the ILECs' campaign to frustrate competition through endless litigation.

The ILECs' attempts to refute these irrefutable propositions fall wide of the mark. First, even a cursory examination of the ILECs' assertions about competition reveals that they are based on data concerning *percentage growth* in CLEC services, without any discussion whatsoever of the relevant issue -- the *absolute* level of CLEC penetration into the local market (which is minuscule). Second, the ILECs contend that adoption of the prescriptive approach would constitute an abandonment of incentive regulation. To the contrary, the prescriptive approach merely involves a reinitialization of the price cap indices at forward-looking costs. Thus, the ILECs' access charges would still be regulated under a price cap regime, with all of the attendant incentives to cut costs and increase profits. Third, the ILECs mistakenly claim that setting price caps at forward-looking costs would be economically improper. As the Commission has consistently recognized, however, this

claim is incorrect because the Commission's forward-looking cost methodologies do not destroy incentives to invest in the network, and include appropriate joint and common costs.

The comments also confirm that the ILECs' various "pricing flexibility" proposals are grossly premature. Because the ILECs fully retain monopoly power in the access market, granting them pricing flexibility would merely facilitate predatory pricing, cross-subsidization, and other anticompetitive schemes. There simply is no merit to USTA's superficial assertion that retaining "unnecessary asymmetric obligations" on the ILECs will impede the development of competition in the access market. This assertion is applicable only to markets where regulation has kept prices aligned with overall costs, and would produce perverse results if applied to the uniquely distorted market for access services, where prices greatly exceed costs. Furthermore, the commenters also correctly recognize that the "triggers" for pricing flexibility proposed by the ILECs bear no relation to the level of meaningful competition necessary to constrain access charges. As a result, adopting the ILECs' proposals would only impede the growth of competition by allowing the ILECs to selectively undercut new entrants if and when they attempt to enter the market.

Finally, the record also overwhelmingly confirms that the X-Factor should be substantially increased, not decreased. As an initial matter, most of the ILECs' comments on the X-Factor violate the Commission's admonition restricting the scope of issues to be addressed in these comments. Indeed, the comments effectively seek reconsideration of the *X-Factor Order* nearly sixteen months after petitions for such reconsideration were due. In any event, the new "Gollop Report" submitted by USTA is laced with flaws, including the

use highly questionable data, methodological errors in updating the FCC's analysis, and a failure to recognize the much higher productivity results based on an interstate-only analysis of the TFP applicable to the ILECs' interstate access services.

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**REPLY COMMENTS OF AT&T CORP. TO
UPDATE AND REFRESH THE RECORD**

Pursuant to Sections 1.415 and 1.419 of the Commission's Rules, 47 C.F.R. § 1.415, 1.419, and the Commission's Public Notice, FCC 98-256, released October 5, 1998 ("Notice"), AT&T Corp. ("AT&T") submits the following Reply Comments to update and refresh the record in the above-captioned proceedings.

Incumbent local exchange carriers ("ILECs") obviously have a powerful financial incentive to maintain access charges as high as possible for as long as possible, and that desire is amply reflected in their comments. However, the ILECs' comments offer the Commission no legitimate reason why access charges should continue at the same bloated levels. To the contrary, the record now compiled in this proceeding confirms beyond cavil that the only responsible course is for the Commission to reinitialize the price caps at forward-looking costs, and to do so as expeditiously as possible.

Specifically, as shown in Part I, the comments confirm that the Commission should immediately grant the petition filed by the Consumer Federation of America ("CFA") and supported by a broad consensus of access customers and consumers. In so doing, the Commission should adopt mechanisms adequate to ensure that access charges are reduced to cost in the near future. Nor, as shown in Part II, should the Commission adopt the ILECs' proposals for further pricing "flexibility." Moreover, as shown in Part III, the record overwhelmingly confirms that the price cap ILECs' productivity offset or "X-Factor" should be substantially *increased*, not reduced, as the ILECs contend.

I. THE COMMENTS CONFIRM THAT THE COMMISSION SHOULD IMMEDIATELY GRANT CFA'S PETITION AND ADOPT MECHANISMS TO DRIVE ACCESS CHARGES TO COST.

The comments abundantly confirm that the Commission should immediately grant the CFA Petition and adopt mechanisms to drive access charges to cost as soon as possible. As the commenters show, competition robust enough to put competitive pressure on access charges does not exist, and is not likely to exist in the foreseeable future. It is now clear that the Commission's market-based approach will not result in the access charge reductions that the Commission expected and that are manifestly in the public interest. Therefore, the Commission should now accelerate the access reform plan's "prescriptive backstop," as it previously indicated it would in the event that "competition is not developing sufficiently for the market-based approach to work." First Report and Order, *Access Charge Reform, et. al.*, 12 F.C.C.R. 15982 (1997) ("*Access Reform Order*"), ¶ 48.

In particular, the commenters offer overwhelming evidence that competition in the exchange access market has failed to develop to significant levels.¹ Indeed, as MCI WorldCom points out, while CLECs have gained perhaps 123,680 access lines nationwide through the purchase of unbundled network elements, the RBOCs and GTE alone have *added* 6 million new lines between 1997 and 1998. MCI WorldCom at 8 n.14; *see also* CPI at 8 (CLEC entry unlikely to put market pressure on rates, since CLEC growth is slower than total growth). The comments further confirm that this level of competition is unlikely to increase dramatically in the foreseeable future. As many commenters note, the Eighth Circuit's decisions have thus far dealt a crippling blow to UNE-based competition;² the ILECs are not close to providing either nondiscriminatory OSS interfaces that could support substantial competition³ or nondiscriminatory collocation arrangements;⁴ the ILECs continue to render UNE-based competition infeasible through prohibitively expensive non-recurring charges;⁵ and the ILECs have mounted a general campaign to frustrate competition through

¹ *E.g.*, MCI WorldCom at 7-9; Sprint at 4-6; Ad Hoc at 3-4; CompTel at 10-11; CFA at 2-3; CPI at 2, 8; ACTA at 3-4; Cable & Wireless at 4-6.

² *E.g.*, MCI WorldCom at 15; CompTel at 10; CPI at 5; Ad Hoc at 6 (8th Circuit decisions have created "severe technical impediment" to UNE competition).

³ *E.g.*, Ad Hoc at 6 & n.10; CPI at 6; Cable & Wireless at 4.

⁴ *E.g.*, MCI WorldCom at 15; Cable & Wireless at 4.

⁵ MCI WorldCom at 14 & n.26, 16.

litigation.⁶ Accordingly, as these commenters conclude, it is essential that the Commission now resort to the prescriptive backstop as soon as possible.

The ILECs' attempts to refute these showings boil down to three baseless claims. First, the ILECs claim that competition in the exchange access market is in fact sufficient to constrain access prices, but they offer no credible evidence to support these claims. As AT&T showed previously (at 5 & n.7), all of the price cap ILECs continue to price at the cap in virtually every category. Moreover, the ILECs' attempts to show that competition is flourishing are limited largely to assertions about the bare number of CLECs and the fact that CLECs' services may be growing by large percentages⁷ -- without any discussion whatsoever of the *absolute* level of CLEC penetration into the local market, which is minuscule. And SBC's extravagant and undocumented recent assertion that it has lost one million access lines, even if taken at face value, simply underscores the point.⁸ Of these one million lines, 649,962 are irrelevant for present purposes because they are resold lines, which by definition do not permit the CLEC to compete in exchange access services.⁹ That leaves a mere

⁶ See MCI WorldCom at 15-16 (quoting federal district court's scathing rebuke to Southeastern Bell's tactics of "[fighting] tooth and nail for every obviously non-meritorious point" in "voluminous briefing").

⁷ See, e.g., USTA at 7 (asserting merely that CLECs are growing at an annual rate of 100%); see also BellSouth at 13 (claiming that MediaOne is estimated to have 10 percent market share of local residential market "in areas where it provides service in Atlanta").

⁸ See USTA at 8; Applications of Consent to Transfer of Control of Licenses and Section 214 Authorizations from Ameritech Corporation, Transferor, to SBC Communications, Inc., Transferee, Affidavit of Stephen M. Carter (SBC), Attach. 1 (July 24, 1998) ("*Carter Affidavit*").

⁹ *Carter Affidavit*, Attach. 1.

367,921 lines as "facilities-based" lines,¹⁰ which amounts to about 1 percent of SBC's total market. In short, the ILECs have done nothing to rebut the commenters showing, seconded by the Commission itself in recent orders (*see* AT&T at 4-5 (citing orders)), that the ILECs' access services face no meaningful competition.

Second, the ILECs and their affiants are mistaken in contending that adoption of the "prescriptive approach" would constitute an abandonment of incentive regulation.¹¹ To the contrary, the term "prescriptive approach" has always been a misnomer. The "prescriptive approach" would involve only a reinitialization of the price cap indices. The ILECs' access charges would still be regulated under a price cap regime, with all of the attendant incentives to cut costs and increase profits.¹² Indeed, adoption of the prescriptive backstop could only *improve* incentive regulation: price cap indices that are set billions of dollars above economic cost, as they are today, cannot provide meaningful incentives to act efficiently; they only reward inefficiency.

¹⁰ As Ad Hoc points out (at 5 n.6), it is unclear how SBC has calculated its total of 367,921 facilities-based lines, which are described as "facilities-based CLEC end user E-911 listings." *Carter Affidavit*, Attach. 1. Elsewhere in his affidavit, Mr. Carter specifically states that SBC has sold only 60,535 unbundled loops throughout the SBC region (or less than a 0.2% share).

¹¹ *See* USTA at 3, & Attach. A (William E. Taylor, "Access Reform Again: Market-Based Regulation, Pricing Flexibility and the Universal Service Fund") at 7; BellSouth at 8.

¹² For the same reasons, USTA's claim (at 19) that the Commission has no legal authority to "prescrib[e]" rates is inapposite. The Commission would not be prescribing rates, but merely adjusting the price caps. Indeed, the "prescriptive backstop" has been a part of the Commission's access reform plan from the beginning, and has been upheld by the Eighth Circuit. *Southwestern Bell Tel. Co. v. FCC*, 153 F.3d. 523 (8th Cir. 1998).

Third, the ILECs' claims that setting price caps at forward-looking incremental cost would be inappropriate as an economic matter are groundless and have been previously rejected by the Commission. The ILECs rely heavily on their time-worn assertions that incremental pricing methodologies are inappropriate because access services involve substantial joint and common costs,¹³ but the Commission has consistently recognized that its forward-looking cost methodologies should include forward-looking joint and common costs. Indeed, the Commission's Hybrid Cost Proxy Model ("HCPM"), chosen within the last month, does just that.¹⁴ Moreover, the Commission's HCPM includes methods for measuring switching and transport that are similar to the HAI model, thus squarely refuting Professor Taylor's claims¹⁵ that the HAI model is inappropriate for measuring the cost of switched access.¹⁶ Finally, the Commission has repeatedly refuted the ILECs' claims that access charges based on forward-looking cost will destroy incentives to invest in the network.

In sum, USTA and the ILECs have not and cannot rebut the showing made by the majority of commenters that access charges must be immediately reduced through the prescriptive backstop. In the absence of meaningful competition in the access market, such

¹³ See, e.g., USTA at 17-18, & Attach. A at 15.

¹⁴ Fifth Report and Order, *Federal-State Joint Board on Universal Service, et al.*, CC Docket Nos. 96-45 & 97-160, (rel. Oct. 28, 1998) ("*Cost Model Order*"); see also First Report and Order, *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, 11 F.C.C.R. 15499 (1996) ("*Local Competition Order*"), ¶ 682.

¹⁵ See USTA, Attach. A at 10.

¹⁶ See *Cost Model Order*, ¶¶ 71-80.

an approach is the only way to protect the market and the public from the ILECs' inflated charges.

II. THE RECORD FURTHER CONFIRMS THAT THE COMMISSION SHOULD NOT ADOPT THE ILECS' PRICING FLEXIBILITY PROPOSALS WHILE ACCESS CHARGES REMAIN AT INFLATED LEVELS.

The comments also confirm that the ILECs' various "pricing flexibility" proposals are grossly premature.¹⁷ As many commenters recognize, the ILECs fully retain monopoly power in the access market, and under those circumstances pricing flexibility would merely facilitate predatory pricing, cross-subsidization, and other anticompetitive schemes. The danger of allowing pricing flexibility prior to the development of meaningful competition is manifest. For example, the geographic deaveraging proposed by Bell Atlantic, Ameritech, and USTA would permit an ILEC to keep rates at supracompetitive levels in lower density areas where there is no competition, and then use these monopoly revenues to subsidize predatory pricing in high density zones where some limited competition is beginning to take hold. For these reasons, the majority of commenters correctly observe that "[t]he dangers of premature deregulation of ILEC access charges are well documented in [the] record in these proceeding," Sprint at 13, and that "it is more likely that the additional pricing flexibility proposed by the ILECs would enable them to preempt the development of access competition," rather than promote it, and "would only exacerbate the flaws inherent in the market-based approach." MCI WorldCom at 36.

¹⁷ *E.g.*, AT&T at 9-11; MCI WorldCom at 36-44; Sprint at 9-13; Time Warner at 17-19; MediaOne at 3-6; ALTS at 6; Cable & Wireless at 5-6; CPI at 9-11; ACTA at 3-6; GSA at 7-10; NEXTLINK at 8-13; CompTel at 18-19.

Nor is there any merit to USTA's superficial assertion that retaining "unnecessary asymmetric obligations" on the ILECs will impede the development of competition in the access market. USTA at 30 & Attach. A. This argument simply rehashes a claim made in a paper by William E. Taylor and Richard Schmalensee, and it has been thoroughly refuted in a paper co-authored by Janusz A. Ordover and Robert D. Willig. *See* AT&T, Attach. A . Ordover and Willig demonstrate that USTA's assertion is applicable only to markets where regulation has kept prices aligned with overall costs, and is *inapplicable* to the uniquely distorted market for access services, where prices greatly exceed costs. AT&T, Attach. A at 2. In this latter market, asymmetric concentrations of market power require asymmetric regulations because "unrestricted ILEC pricing flexibility in access markets can be used to thwart entry and stymie the growth of competition . . . while denying the broad access market the benefits of across-the-board reductions in prices toward costs." AT&T, Attach. A at 8. In such a market, the ILECs' proposed "level playing field" is nothing but a license to exploit their monopoly at the expense of competitors, competition, and consumers.

Most commenters also correctly recognize that the "triggers" for pricing flexibility proposed by Bell Atlantic, Ameritech, and USTA bear no relation to a level of meaningful competition that would be sufficient to constrain access charges. For example, "Phase I" of their pricing flexibility proposals requires only a showing of a state approved interconnection agreement or tariff for unbundled network elements, transport and termination, and resale. As the overwhelming majority of commenters recognize, however, such a trigger confuses *potential* competition with *actual* competition. As a consequence, the ILECs' proposals

effectively advocate deregulation of the access market at a time when the ILECs retain full monopoly power. *See, e.g.,* Sprint at 12-13 ("[t]o allow deregulation to occur only where the mere prospect of potential competition exists would be premature and unwarranted"). Such a result only would impede the growth of competition by allowing ILECs to selectively undercut new entrants if and when they attempt to enter the market. Indeed, USTA's own experts concede that "Phase I" "implies no presumption that competitive forces are adequate to prevent exercise of market power or anticompetitive pricing," USTA, Attach. A at 30, and thus there is no basis for acting on these proposals at this time.

III. THE RECORD CONFIRMS THAT THE X-FACTOR SHOULD BE SUBSTANTIALLY INCREASED, NOT DECREASED AS THE ILECS CONTEND.

The record also overwhelmingly confirms that the X-Factor should be substantially increased, not decreased, and the arguments and "evidence" offered by the ILECs in supposed rebuttal of this conclusion cast no serious doubt on this conclusion. Indeed, as shown below, the ILECs' desperation with respect to this issue is reflected in the fact that they have devoted considerable space to issues that are well beyond the scope of the Commission's Public Notice. Indeed, contrary to the ILECs' arguments, there is no basis for eliminating the Consumer Productivity Dividend (which the Commission found to be fully justified under present conditions), or for relying upon the USTA/Christensen study of total factor productivity (which has previously been roundly criticized and rejected by the Commission in the *X-Factor Order*¹⁸). And the new USTA/Gollop study on which the

¹⁸ Fourth Report and Order, *Price Cap Performance Review for Local Exchange Carriers*,
(continued...)

ILECs now principally rely is based upon questionable data, seriously understates the ILECs' X-Factors (total company) for 1996 and 1997, and has no validity for determining the ILECs' interstate X-Factor.

A. A Number Of The Issues Introduced In The ILECs' Comments Are Impermissibly Beyond the Scope of the Commission's Public Notice.

As a threshold matter, the Commission's October 5, 1998 Public Notice explicitly limited the parties to "updat[ing] their comments and refresh[ing] the record on the *specific arguments raised in the[] petitions for reconsideration*" filed in the *LEC Price Cap Performance Review* proceeding.¹⁹ Yet, despite the Commission's admonition restricting the scope of issues to be addressed in the parties' comments, the major ILECs and their representative (USTA) have attempted to inject numerous additional matters in their responses to the Notice.²⁰ Significantly, none of the price cap ILECs who now submit

¹⁸ (...continued)
12 F.C.C.R. 16642 (1997) ("*X-Factor Order*").

¹⁹ Notice at 2 (emphasis added). As previously pointed out (AT&T at 15), the timely filed petitions for reconsideration of the *X-Factor Order* were directed to discrete issues, namely (1) whether productivity for the ILECs' interstate access services should be measured on an interstate-only basis, rather than on a "total company" basis; (2) whether the Commission should continue the low-end adjustment mechanism in the ILEC price cap plan; (3) whether reinitialization of the newly determined X-Factor should be applied to the ILECs' 1995 tariff year, as well as to their 1996 tariff year; and (4) whether small (rural) and mid-size ILECs, who had made price cap elections, should be exempt from the Commission's newly determined X-Factor applicable to all price cap ILECs.

²⁰ These additional matters include (1) proposing elimination of the Consumer Productivity Dividend ("CPD") in the Commission's X-Factor determination (*see, e.g.*, USTA at 29; SBC at 25-26; Bell Atlantic at 12); (2) recasting and updating the results of the USTA (Christensen) TFPRP model, which had already been rejected by the Commission in the *X-Factor Order* (*see, e.g.*, USTA at 23, and Att. D, App. F, "Review of USTA TFPRP Model"; (continued...)

comments on these matters ever filed a petition for reconsideration directed to the *X-Factor Order*, raising these issues or any other. The Public Notice did not create an alternative forum in which to reargue the merits of the Commission's decision outside the scope of the pending reconsideration petitions, and it does not allow the ILECs to file, in the guise of "comments," what amount to petitions for reconsideration more than sixteen months *after* their due date.²¹ The ILECs are thus foreclosed from attempting to expand the issues delineated for comment in the Public Notice, and the Commission must reject consideration of these extraneous matters raised by the ILECs.

B. USTA's New Study Relies Upon Questionable Data, and Has No Validity for Determining the ILECs' Interstate X-Factor.

Implicitly conceding the deficiencies in the already rejected Christensen TFPRP model, the ILECs now submit a new study, sponsored by USTA and performed by Professor Frank Gollop, which purports to "replicate[] and update[] the X-Factor model adopted by the FCC." *See* USTA, Att. D ("Gollop Report"). On this basis, the ILECs argue, erroneously,

²⁰ (...continued)

GTE at 40); and (3) accusing the Commission of allegedly reaching a "negotiated" result with AT&T (USTA at 21-22).

²¹ *See* 47 U.S.C. §405; 47 C.F.R. §1.429(d) (setting a 30-day time limit for filing petitions for reconsideration). The price cap ILECs' untimely efforts to request Commission reconsideration of these issues is all the more impermissible because these same parties are currently seeking judicial review of the *X-Factor Order*, and raising many of the same issues, before the U.S. Court of Appeals for the D.C. Circuit in *United States Telephone Ass'n, et al. v. FCC*, D.C. Cir. Nos. 97-1469 and consolidated cases. The same parties are precluded from raising the same issues concerning the same order and requesting the same relief before the Commission and the appellate court simultaneously. *See, e.g., Wade v. FCC*, 986 F.2d 1433 (D.C. Cir. 1993) ("It is well established that a party may not simultaneously seek both agency reconsideration and judicial review of an agency's order"); *United Transp. Union v. ICC*, 871 F.2d 1114, 1116-18 (D.C. Cir. 1989).

that these revisions and updating of the FCC's model show a declining trend in the X-Factor results, and that the X-Factor determined by the Commission should be reduced (or at least not increased).²²

Although time limitations have not permitted AT&T to complete an in-depth analysis of the Gollop study prior to filing these Reply Comments,²³ AT&T's preliminary review has revealed many significant infirmities in that study. The deficiencies found in AT&T's initial analysis of the Gollop study relate to (1) the validity of the data underlying the updated study, (2) methodological infirmities in the study's updating of the FCC's analysis, and (3) its failure to recognize the much higher productivity results based on an interstate-only analysis of the TFP applicable to the ILECs' interstate access services.

1. The Data Upon Which Professor Gollop Purports to Rely Are of Doubtful Validity.

Professor Gollop readily admits that much of the underlying industry data he utilized in his 1996-97 update were not derived from officially reported, publicly available Commission sources, but were in fact "provided by USTA" sometimes in the form of USTA's

²² See, e.g., Bell Atlantic at 12; Ameritech at 17-18; GTE at 40; SBC at 25; USTA at 22-23; U S WEST at 11.

²³ Upon receiving the Comments from the ILECs, including USTA's Gollop Report, AT&T specifically requested that USTA "immediately provide" AT&T with access to the "data inputs, formulae and calculations underlying each of the spreadsheets, charts and other schedules" contained in the Gollop Report. See letter from Peter Jacoby, General Attorney, AT&T, to Linda Kent, counsel for USTA, faxed and mailed October 29, 1998. Subsequently, after AT&T's discussions with USTA's counsel and the FCC Staff, USTA's counsel informed AT&T that the underlying data for the Gollop study would not be available until November 5th. This extremely short time frame for examination and analysis of Gollop's back-up material (leaving only one business day before reply comments are due) severely constrained AT&T's ability to complete a detailed review of the USTA study.

"preliminary estimates" or "revisions" of the published data. *See* Gollop Report at 4-6, and App. F. Professor Gollop acknowledges that he did not consistently use the same official industry-specific reports as those followed in the FCC's X-Factor analysis, such as the Commission's *Statistics of Communications Common Carriers* ("SOCC"), the "Form M" reports, and the "ARMIS" reports. *Id.* Instead, as shown in Appendix F to the Gollop Report, USTA often supplied him with "substituted" data based on its own "estimates" when certain official reports had not yet been released or when the reported data allegedly needed "revision."

Thus, for example, USTA provided Dr. Gollop with USTA's own revisions to substitute for reported data on certain ILECs' local calls and special access lines in 1997, and with USTA's own estimates and projections for intrastate DEMs (dial equipment minutes). Moreover, USTA did not rely on ARMIS data for 1996 labor compensation, but actually substituted its own estimate. *See* Gollop Report at 5, and App. F.

AT&T's preliminary analysis of Gollop's supporting data reveals several situations where those data have highly questionable validity. Some of the USTA data supplied to Gollop contradict published data (*e.g.*, the Preliminary SOCC for 1997) and other publicly available data (*e.g.*, reported data accessible from the Internet FCC web site). Moreover, there is no valid documentation for the substitution of USTA's "estimates" and "revisions."

USTA claims, for example, that the figures for intrastate DEMs had to be estimated for 1996 and 1997, because the "Joint Board Monitoring Report" has not yet been published. *See* Gollop Report, App. F. Thus, USTA simply "estimates" a 4.5 percent annual growth rate

to project intrastate DEMs in 1996 and 1997. *Id.* p. 5. The fact is, however, that the FCC web site reports that the ILECs' intrastate DEMs grew in 1996 at the much higher rate of 6.6 percent. Hence, USTA's assumption of only a 4.5 percent growth rate for intrastate DEMs in 1996 substantially understates the ILECs' growth in total output, and produces a downward bias in Gollop's updated X-Factor results.²⁴

In addition, USTA's estimated number for special access lines in 1997 is substantially less (about 3.4 million lower) than the number reported in the Preliminary SOCC for 1997, and USTA's underestimate leads to a much lower X-Factor for 1997. And USTA's revisions to 1997 local calls and special access lines, which assertedly originated with New York Telephone Company and US WEST (*id.* USTA Attachment), have nowhere been explained or corrected in the public record.

Professor Gollop's admission that he had to depend on USTA-provided estimates for considerable data that materially affect the results of his 1996-97 update casts serious doubt about the objectivity and reliability of his study. The Commission has pointed out that the TFP studies it considers should rely on "publicly available data." *X-Factor Order* ¶ 19. *See also* Fourth Further Notice of Proposed Rulemaking, *Price Cap Performance Review for Local Exchange Carriers*, 10 FCC Rcd. 13659, 13662-63 (1995) ¶¶ 16, 17, 21 (X-Factor calculations should be "based on accessible and verifiable data," and data should be "publicly available in a timely fashion"; the "public availability of data" helps "ensure auditability" of

²⁴ Further, data on DEMs for 1997 are publicly available on the state level, and thus these data can be aggregated to the RBOC level to serve as a much more reliable indicator of growth than the arbitrary estimates supplied by USTA.

the parties' X-Factor calculations). Accordingly, as Dr. Gollop recognized, the FCC's analysis in its *X-Factor Order* relied on industry-specific information derived from publicly available data and published reports (e.g. SOCCs, Form M reports, ARMIS reports). Unfortunately, Professor Gollop did not adhere to the same FCC data sources in making his 1996-97 update.

The Commission's requirement that supporting data be publicly available and accessible allows those data to be independently verified.²⁵ Therefore, given the fact that substantial underlying data for the Gollop study are not verifiable, have highly questionable validity, and are dependent on USTA's subjective and undocumented estimates, Professor Gollop's study for the years 1996-97 cannot be viewed as a valid update of the FCC's X-Factor analysis.

2. Preliminary Adjustments of Gollop's Update Show Significant Increases in That Study's X-Factor Results in Recent Years.

Citing Professor Gollop's update of the FCC's X-Factor analysis, USTA argues that this update's 1996-97 results indicate that the X-Factor for the ILECs' interstate access services has been in a "downward trend" and was set "too high." USTA at 22-23. On its face, it strains credulity to accept USTA's assertion that the ILECs' interstate productivity has declined in the past two years -- especially in view of the fact that the price cap ILECs' interstate earnings in 1996 and 1997 have reached unprecedented heights in those years (an

²⁵ AT&T's inability to verify many aspects of the Gollop study is exacerbated by the fact that USTA did not provide promptly the supporting data, worksheets, and other source material, and this delay effectively obstructed a more thorough analysis of that study by AT&T prior to its preparation and submission of these Reply Comments. *See note 23 supra.*

interstate rate of return of 15.15 percent in 1996, and 15.64 percent in 1997). See AT&T at 23.²⁶ Moreover, Professor Gollop's update, using ILEC total company data instead of ILEC interstate data, necessarily injects a significant downward bias in the results. There is no justification for equating the ILECs' total company productivity with their *interstate* productivity. As AT&T has shown and will further demonstrate below, the ILECs' X-Factors for their interstate access services are substantially higher than those computed by Professor Gollop.

AT&T's review of the Gollop study discloses, even on a preliminary basis, that his update produces a pronounced understatement of the ILECs' X-Factor, even when calculated on a total company basis. A recalculation of Gollop's update, just to reflect reported data, indicates that his X-Factor results for 1996-97 should be increased by 0.4 to 1.1 percentage points. Moreover, applying a more appropriate measure of local output (minutes rather than calls) produces a substantial increase in Gollop's 1996-97 X-Factors (on a total company basis). This recomputation more than doubles Gollop's estimates, and thereby increases the X-Factor (without CPD) in 1996 and 1997 to an average of 7.4 percent -- far above the average of about six percent (without CPD) determined in the FCC's analysis for the pre-1996 period.

²⁶ In referring to the exceptionally high interstate rates of return experienced by the price cap carriers in 1996-97, GSA points that: "[A] comparison of the actual rates-of-return experienced by price cap carriers with the 11.25 percent [Commission] standard demonstrates that the existing 6.5 percent X-Factor does not reflect the productivity gains that interstate carriers are now actually experiencing." GSA at 6.

The corrections of Professor Gollop's 1996-97 update of the ILECs' X-Factors, determined on a total company basis, are further explained and set forth in the attached Reply Statement of Dr. Norsworthy (Attachment A). The following schedule shows a comparison of Professor Gollop's update and AT&T's corrections.

**Schedule R1: Comparison of Gollop Updated X-Factor
Results With Corrected X-Factors
(1996-97)**

<u>Year</u>	<u>X-Factor (Per Gollop)*</u>	<u>Corrected X-Factor</u>	
	(1)	<u>Using Local Call Outputs**</u> (2)	<u>Using Local DEM Outputs***</u> (3)
1996	2.11%	2.53%	5.15%
1997	4.14%	5.17%	9.65%

* See Gollop Report, App. A, Chart D1.

** See Reply Statement of Dr. Norsworthy, Chart D1.

*** See Reply Statement of Dr. Norsworthy, Chart D1-A.

In obtaining the results shown in Column (2), Dr. Norsworthy recomputed the Gollop update to restate those results according to published data. Thus, Dr. Norsworthy adjusted the Gollop study for the reported figures for labor compensation in 1996, intrastate DEMs in 1996 and 1997, and the growth in special access lines in 1997. As noted above, a most egregious data problem in Gollop's update is his reliance on USTA's projections of intrastate DEMs in 1996 and 1997 (4.5 percent a year) whereas the growth rate in intrastate DEMs reported on the FCC web site is 6.6 percent in 1996. Dr. Norsworthy makes a correction for this understatement, which is also reflected in the Column (2) results.

The results shown in Column (3) in the schedule above reflect a substantive change in Gollop's estimate of local output based on the number of local calls. Professor Gollop merely accepts the convention of using local calls as the measure of local service output, rather than taking into account the significant growth in the minutes of local use that has occurred since 1995. Recent data show that the minutes per local call have been increasing substantially, and this raises serious doubt about whether the number of local calls as such is an appropriate measure to be used in determining local output. The recently experienced increase in the number of minutes per call is likely attributed to, *inter alia*, the greater minutes per call associated with increased customer use of Internet connections.²⁷ Accordingly, a more accurate measure of local output under current conditions is the number of local minutes (local DEMs) rather than local calls. With this readjustment of Gollop's updates for 1996 and 1997, his X-Factor results, as shown in Column (3) above, increase markedly in each year. *See* Reply Statement of Dr. Norsworthy.²⁸

²⁷ US WEST, for example, has emphasized the extremely sharp rise in the number of minutes per call caused by increasing Internet use in the past two years. US WEST pointed out in its Comments (at 8) that its "local use per line for the years 1991 through 1995" was relatively stable, but that its number of minutes of use per line per year increased sharply in 1996 and rose even more in 1997. US WEST thus stated: "A very large proportion of this increase is attributed to Internet usage -- we now estimate that the average line used for local calling and Internet access generates 64 minutes of use per day, while the average non-Internet user generates 39 local minutes of use per day." *Id.*

²⁸ The change from local calls to local DEMs to measure local service output is more consistent with the FCC Staff's other measures of intrastate and interstate output, and in any event would have a very small effect on the results of the Staff's analysis for the pre-1996 period. Recasting the FCC Staff's analysis for 1986 to 1995, to reflect local minutes rather than local calls, results in only minimal differences in the results -- the differences between the growth rates for local minutes and local DEMs averaged only 0.08 percent per year in
(continued...)

Moreover, Professor Gollop's update is substantially impacted by his computation of the "capital rental price index."²⁹ His low X-Factor result in 1996 is also attributable to an unusually large increase (over 9.0 percent, *per* Gollop Report, App. A., revised Chart D9, Col. J) in that year's capital rental price index, an index whose general trend has been downward in most years prior to 1996. This sudden increase has the effect of inflating the overall input price index and thereby reducing the X-Factor by an equivalent amount. This increase in the "capital rental price," calculated by Prof. Gollop, is associated mainly with the huge surge in ILEC operating earnings in 1996 and 1997, and has nothing to do with any increase in the *real* cost of ILEC inputs.³⁰ Unless one considers excessive ILEC earnings as a legitimate input cost, it is clearly erroneous to consider soaring ILEC earnings as an indication that ILEC X-Factors are declining.

In sum, when growth in local output under present conditions is properly measured, and when Professor Gollop's underlying data are corrected, there is absolutely no basis for

²⁸ (...continued)

1986-95. However, in the past two years this change has had a substantial impact on the X-Factor results as shown above. Moreover, because local minutes are a much better measure under current conditions (especially because of recently increasing Internet use), it is recommended that, in the event the FCC Staff continues to produce total company X-Factor results, reliance on local DEMs would be more suitable to use in measuring local output. These problems in measuring local output could be avoided entirely if the Commission were to rely on interstate-only measures rather than "total company" measures.

²⁹ As Dr. Norsworthy points out in his Reply Statement, the use of the term "capital rental price" is essentially a misnomer and should be better described as a "capital charge to customers."

³⁰ Data from recent ILEC ARMIS reports show that the RBOCs' total composite (state and interstate) rates of return rose by 159 basis points in 1996 and by another 110 basis points in 1997.

concluding that the ILECs' X-Factor has declined in the last two years. Indeed, the opposite is true. As shown above, use of local DEMs to measure local output and corrections of the data bring the X-Factor for 1996 and 1997 (on a total company basis) to an average of 7.4 percent in those two years. In addition, as we will further demonstrate, computing the ILECs' productivity on an interstate-only basis results in much higher X-Factors for the ILECs' interstate access services.

3. When Determined on an Interstate-Only Basis, the X-Factor Results For the ILECs' Interstate Access Services Are Substantially Higher.

It is noteworthy that in his Report Professor Gollop conspicuously avoids dealing with the question whether his estimates of ILEC TFP, determined on a "total company" basis, are a reliable estimate of the ILECs' TFP applicable to their *interstate* access services. Indeed, the data that Professor Gollop produced, concerning the relative growth rates for the ILECs' interstate outputs and their total company outputs, strongly suggest that his total company TFP calculations substantially *underestimate* interstate TFP. The following schedule shows Gollop's revised and updated computations of ILEC interstate output growth and ILEC total company output growth.

Schedule R2: Comparison of ILEC Output Growth Rates, Computed by Gollop, on Interstate-Only Basis and Total Company Basis (1986-1997)

Year	ILEC Interstate Output Growth*	ILEC Total Company (Local, Intrastate & Interstate) Output Growth**
1986	5.14%	3.45%
1987	7.78%	4.22%
1988	12.19%	3.98%
1989	6.05%	5.23%
1990	11.49%	5.98%
1991	9.83%	4.25%
1992	5.96%	3.73%
1993	11.27%	4.77%
1994	8.71%	5.08%
1995	9.59%	5.69%
1996	9.44%	4.97%
1997	7.91%***	4.23%
Average 1986-97	8.78%	4.64%

* ILEC interstate output growth rates for 1986-97 are based on Gollop Report, App. A, Chart D4.

** ILEC total company output growth rates for 1986-97 are based on Gollop Report, App. A, Chart D5.

*** AT&T's recomputation of Gollop's Chart D4 indicates that his updated ILEC interstate output growth rate for 1997 should be 10.13%, and thus that the average interstate output growth rate for the 1986-97 period should be 8.97%. See Reply Statement of Dr. Norsworthy, p. 3.

The Gollop figures shown above further confirm, as did similar data in the FCC Staff's analysis, that the growth in the ILECs' interstate outputs far exceeds the growth in their total company outputs. In each year (including Gollop's updates for 1996 and 1997) ILEC interstate output grew at a substantially *higher* rate than did ILEC total company output. And the ILECs' interstate output growth rate for the period 1986-97 averaged almost *twice* that of the growth rate for the ILECs' total company outputs (8.78% v. 4.64%). These vast differences in the relative output growth rates convincingly demonstrate that ILEC interstate productivity is significantly greater than ILEC total company productivity. See AT&T at 18-19.³¹

Notably, one of the principal economic consultants to the price cap ILECs, Dr. William Taylor of National Economic Research Associates (NERA),³² has emphasized that the ILECs' interstate productivity must be considerably greater than their total company productivity. Thus, Dr. Taylor explained, from the standpoint of their relative input costs, why the ILECs' interstate productivity should exceed their local, intrastate productivity:

³¹ In its Comments USTA implicitly concedes that a change in the ILECs' output growth rate would produce a change in the same direction in their productivity growth rate. As USTA pointed out (at 27-28), a "10 percent loss in output over five years reduces . . . TFP by between 0.6 percent and 1.0 percent per year," and a "20 percent loss in output over five years reduces TFP growth by 1.2 percent to 2 percent per year." This is a flat admission by USTA that there is a *direct* relationship between changes in *output* growth and *productivity* growth. The converse of USTA's example is thus equally relevant -- *i.e.*, a 20 percent *gain* in output over five years results in 1.2 - 2.0 percent annual *gain* in total factor productivity.

³² USTA quite obviously relies heavily on Dr. Taylor's economic analysis, as shown by its inclusion of a lengthy statement from Dr. Taylor as Attachment A to USTA's Comments.

*"Opportunities to increase productivity growth in the interstate jurisdiction must be greater than in the state jurisdictions. Switching and interoffice transmission equipment heavily influence productivity growth in the interstate jurisdiction. Prices of such equipment have fallen rapidly, and its capabilities have increased rapidly. In the state jurisdiction, however, loop costs dominate. I understand that loop cable prices and their installation costs have been increasing modestly rather than decreasing."*³³

Dr. Taylor further concluded that:

"It is reasonable to expect that productivity growth experienced historically in [the interstate access] market would be substantially greater than the overall rate of productivity growth experienced by local exchange companies in supplying all services

*"[T]he productivity differential for services in the state jurisdiction must necessarily be less than [the productivity differential for interstate access services] [I]nterstate productivity growth must be faster than the overall average productivity growth for local exchange carriers..."*³⁴

Similarly, Dr. Lewis Perl, one of Dr. Taylor's colleagues at NERA (a principal consulting firm to the price cap ILECs), testified on behalf of BellSouth that an interstate productivity estimate "provides no evidence of what overall productivity growth has been, or will be, for local exchange companies" in supplying their local services. As he stated:

"Price caps adopted in the interstate jurisdiction apply principally to interstate access service. There is every reason to expect that productivity experienced historically in the interstate access market would be substantially greater than the overall rate of productivity growth experienced by local exchange companies in supplying all services. First, most of the productivity growth experienced in the telecommunications industry is related to reductions in switching costs and to the savings in transmission costs which occur as a result of using electronics to expand

³³ Testimony of Dr. William E. Taylor before N.C. Utils. Comm'n, Docket No. P-7, Sub 825, et al. (Feb. 9, 1996) at 16 (emphasis added).

³⁴ *Id.* at 38-39 (emphasis added).

the carrying capacity of transmission facilities. In contrast, productivity growth in supplying loop services has historically been markedly slower."³⁵

Thus, Dr. Perl concluded that the rate of productivity growth determined for ILEC interstate access services "would not imply that a similar growth rate was appropriate for other components of [local] telephone services."³⁶

Accordingly, from the standpoint of the relative ILEC output growth rates (where the data show that interstate output growth far exceeds total company output growth) and the relative economies and efficiencies of ILEC inputs (where, as Drs. Taylor and Perl recognize, interstate costs are declining much more rapidly than the costs of providing local telephone service), there is overwhelming evidence that ILEC interstate productivity is much greater than ILEC total company productivity.³⁷ For these reasons, the price cap ILECs have been arguing strenuously before state regulatory commissions in state price cap proceedings that their intrastate productivity rates must be set much lower than their interstate productivity rates. *See* AT&T at 20-21, and Att. B; Ad Hoc at 15-16. Moreover, in response

³⁵ Testimony of Dr. Lewis J. Perl, on behalf of BellSouth, before N.C. Utils. Comm'n, Docket No. P-55, Sub 1013 (Jan. 26, 1996) at 13, 24-25 (emphasis added).

³⁶ *Id.* at 25.

³⁷ *See also* Ad Hoc at 12-14, demonstrating that (1) the "rate of growth for interstate switched access minutes has historically exceeded that of intrastate services and continues to do so," (2) "the LEC's interstate switched access services, have been and continue to be heavily impacted by technology (digital switching, Signaling System 7, Advanced Intelligent Network) and to require minimal labor input on an ongoing basis," and (3) given this "technology profile, ... the particular mix of services regulated at the interstate level will experience significantly *lower* overall cost growth on a per-unit basis, and thus *higher* productivity gains, than the mix of services regulated at the intrastate level ..." (emphasis in original).

to the ILECs' arguments in this regard, a number of state commissions (e.g., D.C., North Carolina, Maine, Vermont, New York, New Jersey, Pennsylvania, and California) have adopted price cap orders implicitly recognizing that *intrastate* productivity is *lower* than *interstate* productivity. See Ad Hoc at 15-20.

Because Professor Gollop's study does not constitute a reliable estimate of the relevant productivity for the ILECs' *interstate* access services, AT&T has made a recomputation to reflect the substitution of ILEC interstate output data for ILEC total company output data. For purposes of determining inputs, AT&T has used total company inputs, which is a very conservative approach and quite obviously favorable to the price cap ILECs.³⁸ The following schedule shows the comparison between the X-Factors (without the CPD) determined on a total company basis (using the FCC's analysis to 1995, and a corrected Gollop update for 1996-97) and those determined by AT&T through the use of interstate output data.

³⁸ This approach, assuming uniform input growth for ILEC interstate and intrastate services, is most conservative in that it produces X-Factors that are likely understated and thus more advantageous for the price cap ILECs. There are sound reasons to conclude (as discussed above in connection with the statements of Drs. Taylor and Perl, and other data introduced by Ad Hoc) that interstate input costs on a per-unit basis are much lower than local, intrastate input costs on a per-unit basis, especially because technological advances, greater equipment capacities, and price trends have materially benefited interstate services vis-a-vis local services. See also Ad Hoc at 13-14, 22.

**Schedule R3: Comparison of X-Factor Calculations Based on Total Company Outputs
and X-Factor Calculations Based on Interstate-Only Outputs
(1986-1997)**

X-Factor Calculations (Excluding CPD)			
Year	Total Company Basis*	Interstate-Only Basis	
		Recalculated for Interstate Outputs**	Further Adjusted For Separations-Related Inputs ***
1986	-0.5%	0.5%	2.2%
1987	5.0%	9.9%	11.0%
1988	5.0%	14.7%	14.6%
1989	7.9%	7.4%	7.6%
1990	8.8%	14.4%	15.3%
1991	5.8%	11.6%	11.9%
1992	3.4%	5.3%	6.1%
1993	4.7%	10.0%	10.4%
1994	5.4%	9.1%	9.0%
1995	6.8%	10.6%	10.8%
1996	5.2%	6.6%	8.0%
1997	9.7%	10.0%	9.9%
Average 1987-97****	6.2%	10.0%	10.4%

* Based on FCC Staff Analysis for 1986-95 (Chart D1, *X-Factor Order*, 12 FCC Rcd. at 16785) and corrected Gollop update for 1996 and 1997 (see Reply Statement of Dr. Norsworthy).

** Derived by AT&T using ILEC interstate output quantities and corresponding revenue weights instead of ILEC total company outputs. See Reply Statement of Dr. Norsworthy, Chart D1-B.

*** Derived by AT&T using ILEC interstate output quantities and corresponding revenue weights instead of ILEC total company outputs, and further adjusted for separations-related ILEC inputs. See Reply Statement of Dr. Norsworthy, Chart D1-C.

**** In computing average results for this period, AT&T has not included 1986 results, in view of the FCC's finding that 1986 figures are outliers, because that year's estimates are "improbably low in comparison to all the other estimates." *X-Factor Order* ¶139.

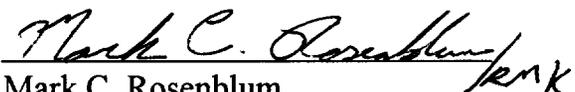
Consequently, the above schedule shows that X-Factors calculated on an interstate-only basis are substantially higher (by at least four percentage points) than those obtained on a total company basis. There are many valid reasons, therefore, to grant AT&T's reconsideration petition calling for the ILECs' X-Factor to be determined on the conceptually sound interstate-only basis.³⁹

CONCLUSION

For the foregoing reasons and those in AT&T's Comments, the Commission should (1) grant CFA's Petition for Rulemaking and adopt mechanisms to reduce access charges to cost as soon as possible, and (2) grant AT&T's Petition for Partial Reconsideration in CC Docket No. 94-1.

Respectfully submitted,

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³⁹ See also API at 10-11 (the Commission should "adopt an interstate-only approach" for determining productivity, and thus avoid the "systematic downward bias in TFP" resulting from the "inclusion of intrastate factors in the TFP output index").

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Attachment A

Reply Statement of Dr. John R. Norsworthy in Response to the USTA Update of the FCC Staff Study of LEC Productivity for Interstate Price Caps

1. General Comments on the Gollop Update of the FCC Staff Study

Professor Gollop's update of the FCC study¹ for USTA has several very significant flaws. As an update of the FCC study, the USTA study is flawed because the data used therein are not presently verifiable. This is so because much of the data are not publicly available. Some of the data used by Gollop contradict published data (Preliminary SOCC for 1997) and publicly available data (ARMIS Reports accessible from the FCC web site on the Internet). To provisionally inform the discussion, we have updated the FCC study based on publicly available data. This update shows some of the implausible results of misreporting by the RBOCs. Even under these difficult circumstances, however, our results make it clear that the Gollop study seriously understates the X-Factor (LEC Price/Productivity Differential) for the two most recent years, 1996 and 1997. Moreover, as a basis for establishing an X-Factor for the price cap of interstate access charges, the Gollop study is irrelevant because it ignores the persistent excess of interstate productivity growth above total company productivity growth. In our analysis, we have calculated a lower bound on interstate productivity growth, and explored its sensitivity to several important factors. These issues are addressed further below.

2. Update of FCC Study Based on Publicly Available Data

On behalf of AT&T and MCI, I have updated the Staff study for the years 1986-1997. The results are displayed in the attached Charts D1 through D12. In addition to the baseline calculations provided by the update, additional scenarios are displayed, and documented through additional corresponding Charts distinguished by appended letters. The X-Factor results for total company performance based on local dial equipment minutes are reported in Chart D-1A and supporting output calculations are shown in Charts D-4A and D5-A. The results for Interstate TFP and X-Factor calculations are shown in Table D-1B, with supplemental calculations. Interstate TFP and X-Factor calculations adjusted for separations-related inputs are shown in Table D-1C, with supplemental calculations in Table D-10C.

A note on the terminology used in the Staff study is necessary. In columns H and I of the study, the term "Capital Rental Price" is used. This is a misnomer. The term is used in economic analysis to denote a long run price concept, based on expected rates of return in alternative investments, depreciation, applicable tax rates, etc.² The short run residual

¹ Attachment D to Comments of USTA, October 22, 1998. The update of the FCC study is in Appendix A.

² For the long run rental price (or user cost) of capital, see Dale W. Jorgenson and Kun-Young Yun, Tax Reform and U.S. Economic Growth, *Journal of Political Economy*, 1990, s151-s193. The Jorgenson-Yun framework is extended to include financial capital and the effects of debt (as opposed to equity) financing in John R. Norsworthy and Diana

return to capital calculated in the Staff study, and applied in our update of that study, is perhaps better described as a "Capital Charge to Customers" (of the LECs) that results from the fixing of interstate access charges. It is not a long run measure, nor is it based on a long run concept. The capital charge is explicitly a short run residual return to capital after other input expenses are met.

3. Flaws in the USTA (Gollop) Update of FCC Study

a. Data Problems in the USTA Study

As noted above, the most serious flaw in the USTA study is that it is undocumented. Its calculations cannot be verified nor its underlying methodology reviewed and assessed. Moreover, the study is based on estimates in some instances where reported data are available. For example³, dial equipment minutes (DEMs) are available at the state level, and can be aggregated to the total RBOC level as we have done to relieve the necessity of estimates. Perhaps significantly, the estimates used by Professor Gollop fall substantially below the totals of the reported data. (Compare Chart D-5 of USTA Attachment D and Chart D-5 of this study.) Moreover, the revisions that Professor Gollop applies to local calls and special access lines, which are asserted to originate with New York Telephone and US West, are nowhere corrected in the public record. For local calls, we have projected total local calls at the RBOCs to 1997 based on the growth rate in that measure from 1991 to 1996. For special access lines, we have used data in the public record, the Preliminary SOCC for 1997. Total labor compensation for the RBOCs shows an implausibly large increase in 1996, followed by a similar decrease in 1997. We have chosen provisionally to use the data as reported, pending our investigation of the changes in reporting procedures, and possible revelation of Professor Gollop's procedures. The use of reported data, as shown in Chart D-1 (attached) leads to measured changes of 8.58 percent in the input price index in 1996 and -1.69 percent in 1997. These data are so far out of line with past history as to be completely implausible. Gollop's (documented but unexplained) adjustments change the results to 5.79 percent and 0.64 percent for 1996 and 1997.⁴ The 1996 figure remains an outlier, approached only by the data for the year 1986, which the Commission has judged to be unusable for purposes of measuring LEC performance.

Total company TFP is shown (Chart D-1) to grow at the prodigious rate of 9.01 percent in 1996 before application of the undocumented data used by Professor Gollop. That this performance is somehow offset by data from the RBOCs that are not publicly available suggests opportunistic reporting or, at a minimum, carelessness in their initial reports.

H. Tsai, *Macroeconomic Policy as Implicit Macroeconomic Policy: Its Industry and Enterprise Effects*, Kluwer Academic Publishers, 1998.

³ Unnumbered page at the end of Appendix F, Attachment D.

⁴ Chart D-1, p. A-1, Attachment D.

The materials price index has been updated in the USTA study. We have provisionally adopted the resulting series, pending a review of the procedures used by Professor Gollop, because the data on which it is assertedly based are publicly available. In consequence, the remaining differences between the two studies represent authentic points of disagreement.

b. Errors in USTA's Updating the FCC Staff Study for 1996 and 1997

The Gollop update shows interstate output growth at 9.44 percent in 1996 and 7.91 percent in 1997.⁵ The correct numbers are 9.51 percent and 10.13 percent, respectively. The source of Gollop's error could not be determined because his calculations were not made available in time for our analysis. The understatement in 1997 is particularly serious. These errors, as well as the use of estimated data where actual data are available for DEMs, result in his understating the total company X-Factor to be 2.11 percent and 4.14 percent in 1996 and 1997, respectively.⁶ The comparable results based on use of publicly available data are shown in Chart D-1 (attached) as 2.53 percent and 5.17 percent respectively.

c. USTA's Inattention to Changing Industry Conditions

Also revealing is the failure to note the divergence between local dial equipment minutes (DEMs) and local calls in the USTA's update of the Staff study. As pointed out in US West's Comments, Internet usage has led to a substantial increase in the average length of local calls.⁷ From 1986 to 1995, the average annual difference in the growth rates of local DEMs and local calls was 0.08 percent. In 1996 local calls for the RBOCs grew at 3.10 percent, and, based on projection of the five year growth rate, 3.72 percent in 1997. Local DEMs grew at 8.46 percent in 1996. State DEMs – which include local DEMs – grew 11.3 percent in 1997. The effect of this modification to reflect local DEMs in recent years increases the total company TFP from 9.01 percent in 1996 (Chart D-1) to 11.64 percent, and from 1.20 percent to 6.17 percent in 1997.

Clearly, under current industry conditions, DEMs are a better measure of local service output to customers than the number of local calls, as US West asserts. In the past, the two measures conveyed quite similar information, and data for the number of local calls were often available earlier than that for DEMs, so that there was little other basis to chose between them. Now, however, it is suggested that the Commission consider substituting local DEMs for local calls as a measure of local service.

⁵ Chart D-4, p. A-4, Attachment D.

⁶ Chart D-1, p. A-1, Attachment D.

⁷ Supplemental Comments and Submissions of US West Communications, Inc. October 26, 1998, p. 8.

4. Interstate TFP and Associated X-Factor

a. The Meaningfulness of Interstate Access Charges

USTA asserts that measurement of interstate productivity performance measure cannot be carried out. One reason advanced is that inputs cannot be separated into those associated with interstate and non-interstate regulated services. If this proposition were true, there would correspondingly be no basis for separating unregulated from regulated service inputs. In fact, the Commission provides guidelines for separating input expenses of regulated from those of unregulated services, and does the same for jurisdictionally interstate and non-interstate services. To argue that separations may be somewhat arbitrary in its details does not refute two propositions that underlie the AT&T calculation of interstate TFP and the associated X-Factor. First, interstate output patently grows much faster than non-interstate regulated output. Even USTA does not assert the contrary. Indeed, in various state proceedings, the RBOCs assert that their state-regulated rates should be based only on their non-interstate productivity performance because they obtain greater economies of scale in the interstate arena. This proposition clearly implies that inputs in interstate services are growing more slowly relative to output than in total company operations. Second, for the purpose of avoiding some of the ambiguities in the jurisdictional separations process, AT&T computes a lower bound on interstate TFP growth by the very conservative assumption that interstate inputs grow at the same rate as total company inputs. The RBOCs' own assertions in state jurisdictions concede that this as a conservative assumption. The fact that we cannot precisely and unambiguously measure interstate inputs is no basis for ignoring the much faster growth of output in the interstate sector. In fact, ignoring this fact in setting the price cap X-Factor for interstate access charges has resulted in rapidly growing profitability in interstate services, as is shown below in Table 1.

Economies of scope are also cited as a reason why interstate and other regulated output cannot be separated.⁸ This reasoning applies equally, if not more so, to separation of unregulated from regulated services. Indeed, USTA's "know-nothing" argument concerning the difficulty of separating regulated from unregulated inputs is reminiscent of its argument (since rejected by the FCC) that the input price differential is zero.

This remarkable line of reasoning is in fact exemplified by the paper clip example it cites, attributed to Christensen Associates. This paper clip analogy is clearly inapposite because it is well known that different combinations of inputs are involved in producing interstate and local services, even if their exact quantitative separation is ambiguous.⁹ USTA does not assert directly that interstate services require more inputs per unit of service than local

⁸ USTA Comments, p. 25.

⁹ For example, local service requires labor-intensive directory services that are not similarly required for interstate services.

and intrastate service. To do so would contradict their frequent assertions to the contrary in state regulatory proceedings, where their financial stakes are much higher.

b. The X-Factor for Interstate Access Charges

Chart D-1B shows the TFP and X-Factor computed for interstate access services. The TFP measure for interstate access, based on the growth in total company inputs, is a *lower bound* on actual TFP growth in interstate services, because it is well-known that interstate access services require far less labor than local services, and because most inputs of all types are used in common by all regulated telephone services, local, intrastate, and interstate. As shown in Chart D-4, interstate output grew at an average annual rate of 9.32 percent, yielding an interstate X-Factor of 9.97 percent for the 1987-1997 period. The FCC's X-Factor of 6.5 percent is clearly well below the documented interstate performance of the RBOCs. The growth rate of the interstate input measure can be approximated from above – an upper bound – by computing a Fisher index of total company input using depreciation as the weight for the capital input, rather than the total return to capital. The measure is an upper bound on interstate input growth to the extent that a) total company labor and materials inputs grow faster than interstate labor and materials inputs, and b) total company capital inputs grow faster than interstate capital inputs. Both propositions conform to conventional wisdom in the telephone industry. If there is direct evidence that can be brought to bear on these propositions, so much the better. However, the state and federal regulatory proceedings are replete with statements that there are far greater economies of scale in interstate than in local and/or intrastate services. Lacking other direct evidence, we feel quite comfortable in asserting that our measure of the growth of interstate inputs formulated here results in an upper bound on the true growth rate.

c. Consequences of Adopting a Low X-Factor for Interstate Access Charges

AT&T has urged the Commission to base its X-Factor for interstate access charges on TFP growth in provision of interstate services. The earlier Performance Based Model submitted by AT&T, as well as the FCC study, show much more rapid growth in interstate than in total company output. This fact alone requires that an interstate-based TFP performance measure should be the basis for the price cap in interstate access charges. A consequence of the use of a total company-based X-Factor is the rapidly increasing rate of return in the RBOCs' interstate services as displayed in Table 1. The effect is exacerbated by elimination of the sharing provision recently adopted by the FCC. The low X-Factor has resulted in rapidly increasing real rates of return (rates of return adjusted for the effect of inflation) in the interstate services of the price cap carriers, as Table 1 below shows.¹⁰

¹⁰ Rate of return data are for all price cap LECs. Although the years 1991 to 1994 include AT&T Communications, the results are not materially affected thereby.

That these real rates of return are quite high is underscored by the exceptional market performance of the common stocks of the RBOCs, as compared to the general market performance.

Moreover, there is a disconnect between the rates of return reported in the RBOCs' filings of Form 492 and the measurement of TFP. When capital input is computed on the basis of the perpetual inventory method prescribed by the Commission, their rates of return are about three percent higher on average than those calculated from Form 492 reports. These high rates of return clearly show that the RBOCs' productivity performances in interstate services have been higher than the Gollop study shows, based on total company TFP.

These unintended results of the low X-Factor for the interstate access price cap also impart a bias to the TFP measures. The basis for the price cap regulation of interstate access was at least in part that impending competition would begin to restrain access prices charged by the ILECs. This has not occurred. As a result, the residual return to capital is higher than would have resulted if the Telecommunications Act of 1996 had had its anticipated effect. In particular, the lack of restraining competition has led to high rates of return, and correspondingly high capital charges to customers of the RBOCs. These charges have led in turn to decreased measured productivity growth because the weight of capital in the TFP calculation has been increased thereby.

Finally, the high rates of return in Table 1 clearly reflect the low X-Factor adopted for the price cap LECs' interstate access services. If the X-Factor were increased to the level warranted by the RBOCs' performances documented in Chart D-1B, about 10 to 10.5 percent with a CPD, their interstate rate of return would be somewhat lower. It would not be dramatically lower, however, because the elasticity of demand for interstate access services is rather high (estimated to be about .8, so that roughly 80% of the revenue lost from reduced rates is recovered in increased demand for services).¹¹

¹¹ Y. Lee and J.R. Norsworthy, "The Customer's Case for Bundled Services", to be presented at the Conference on Technology Management, Institute of Electrical and Electronics Engineering (IEEE), Puerto Rico, October 1998.

Table 1: Real Rate of Return in Interstate Services

Year	Consumer Price Index All Urban Workers 1991 = 100	Annual Inflation: Change in CPI	Target Rate of Return: 1991	Real Rate of Return Based on 11.25% in 1991	Interstate Rate of Return: All Price Cap Carriers	Real Rate of Return in Current Year
	A	B	C	D	E	F
1990	95.4					
1991	100.0	4.8%	11.25%	6.4%	11.78%	6.96%
1992	105.4	5.4%	11.25%	5.8%	12.42%	7.02%
1993	109.8	4.2%	11.25%	7.0%	13.12%	8.91%
1994	113.1	3.0%	11.25%	8.2%	13.58%	10.57%
1995	116.5	3.0%	11.25%	8.3%	14.02%	11.03%
1996	119.5	2.6%	11.25%	8.7%	15.15%	12.59%
1997	122.9	2.8%	11.25%	8.4%	15.64%	12.81%

Source: Form 492 reports, Bureau of Labor Statistics for consumer prices.

5. Interstate Output and Separation of Input

In AT&T's submissions in Docket 94-1, AT&T argued that jurisdictional separations information may be used to obtain an interstate measure of TFP. Interstate TFP growth is defined as

$$\Delta TFP_{Int} = \Delta Output_{Int} - \Delta Input_{Int} \quad (1)$$

where the Int subscript denotes interstate measures.

We begin by approximating this as

$$\Delta TFP_{Int} = \Delta Output_{Int} - \Delta Input_{TC} \quad (2)$$

where TC denotes total company input

Interstate output is readily measured directly according to the procedure adopted by the Commission in its X-Factor Order. To obtain a measure of interstate input growth, the growth of total company input is taken as an estimate of interstate input growth, and adjusted for the effect of separations. In its earlier submissions, AT&T argued that a simple adjustment could be made to interstate inputs on the principle that the difference between interstate revenue growth (or decline) and interstate expense growth (or decline) could be used to adjust the movement of interstate inputs relative to interstate outputs. That approach provided a lower bound on the separations effect. The relevant adjustment equation applied earlier is

$$\Delta \text{Interstate Input} = \Delta \text{Interstate Revenue} - \Delta \text{Interstate O\&M Expense} \quad (3)$$

where $\Delta \text{Interstate Input}$ is the year-to-year difference between total company input growth and interstate input growth

$\Delta \text{Interstate Revenue}$ is the year-to-year growth (decline) in Interstate Revenue

$\Delta \text{Interstate Expense}$ is the year-to-year growth (decline) in Interstate Expenditure

Expression (3) is then used to adjust the measure of interstate TFP:

$$\Delta \text{TFP}_{\text{Int}} = (\Delta \text{Output}_{\text{Int}} - \Delta \text{Input}_{\text{Int}}) + \Delta \text{Interstate Input} \quad (4)$$

The interstate revenues and expenditures are defined according to the ARMIS 4301 Report in conformance with the separations prescription of the Commission. However, interstate output rises relative to interstate revenue as a result of declining access charges. Interstate inputs rise more slowly than interstate expenditures because the average price of inputs is (slowly and rather erratically) increasing. Where O&M denotes operation and maintenance, therefore a more accurate estimate of the movement of interstate input is based on the assumption that

$$\Delta(\text{O\&M Expense}_{\text{Int}} / \text{O\&M Input}_{\text{Int}}) = \Delta(\text{O\&M Expense}_{\text{TC}} / \text{O\&M Input}_{\text{TC}}) \quad (5)$$

which gives by inversion

$$\Delta(\text{O\&M Input}_{\text{Int}} / \text{O\&M Expense}_{\text{Int}}) = \Delta(\text{O\&M Input}_{\text{TC}} / \text{O\&M Expense}_{\text{TC}}) \quad (6)$$

Expression (6) is quite well approximated by

$$\Delta \text{O\&M Input}_{\text{Int}} = \Delta(\text{O\&M Input}_{\text{TC}} / \text{O\&M Expense}_{\text{TC}}) + \Delta \text{O\&M Expense}_{\text{Int}} \quad (7)$$

for reasonably small changes. From this expression (7) we get

$$\Delta \text{TFP}_{\text{Int}} = (\Delta \text{Output}_{\text{Int}} - \Delta(\text{O\&M Input}_{\text{TC}} / \text{O\&M Expense}_{\text{TC}}) + \Delta \text{O\&M Expense}_{\text{Int}}) \quad (8)$$

This formulation is applied to measure interstate TFP in Chart D-1C. The change in interstate O&M expense is taken directly from the ARMIS 4301 reports. One further adjustment is made. O&M expense includes depreciation, but not the return to capital in excess of depreciation. Consequently, O&M input should include a capital component calculated by the perpetual inventory method and weighted by depreciation as part of the index (Fisher index) of total interstate input. This procedure results in an input measure for interstate input with a reduced capital weight. It should be noted that this adjustment for separations is only partial. It is desirable to recompute measures of the quantities of labor, materials and capital inputs consistent with the separations allocations. This step has not yet been taken.

When adjustment for separations is applied, Interstate TFPs and X-Factors are altered as shown in Chart D-1B. The modifications are important as to the direction of their effects. Interstate TFP grows at 14.43 and 5.94 percent in 1996 and 1997 after the separations adjustments, and the corresponding X-Factors are 7.95 and 9.91 percent. The separations results, although partial, serve to confirm the point that the interstate performance of the RBOCs in 1996 and 1997 has been quite consistent with their earlier performances, and to confirm that the interstate X-Factor should be considerably higher than the present 6.5 percent.

Summary Remarks and Conclusions

- (1) The USTA update of the Commission Staff study is flawed. It relies upon data that are not publicly available, and uses estimates or projections even when published data are available. The calculations on which the update is based have not been made available in a timely manner for review by other parties to these proceedings. The update does not address the measurement of interstate TFP, which is essential to determining a price cap for interstate access.
- (2) The reports by the RBOCs to the ARMIS system are in certain critical respects implausible. These data problems render the measurement in recent years of the X-Factor and TFP for total company and interstate services problematic.
- (3) The USTA study fails to consider changes in the industry environment that may well have altered the best approach to measuring LEC performance in 1996 and 1997, even though the significance of the changed circumstances has been argued by US West.
- (4) AT&T's update of the Staff study uses only publicly available information, clearly documents data sources and, where necessary, spells out the basis for projections of missing data.
- (5) The AT&T update addresses the measurements of TFP and X-Factor for the interstate access price cap. This analysis, as well as the persistently rising rate of return in the provision of interstate services, demonstrate clearly that a total company-based price cap is substantially too low.
- (6) USTA's assertion that there is no basis for an interstate productivity measure is disingenuous. Several of the RBOCs have argued at the state level that interstate productivity is growing more rapidly than intrastate and local productivity.
- (7) The LECs' monopoly profits, persisting in part because of the slow emergence of competition in local markets, has resulted in a higher residual rate of return to capital. This unintended consequence of a too-low X-Factor for interstate access price cap regulation results in lower measured TFP growth than would prevail in

the competitive market that incentive regulation seeks to mimic.

- (8) The real rate of return (which is the reported rate adjusted for inflation) in interstate services for price cap carriers has risen rapidly to nearly 13 percent in 1997, partly as a consequence of the slowdown in inflation. The unusual profitability of the RBOCs is underscored by the remarkable stock market performances of their common stocks, which have returned more than 20 percent on investment from 1984 to 1995, compared to 13.5 percent for the S&P 500 stocks.

Chart D1: Components of FCC LEC Price Cap X-Factor [Excluding CPD] based on Local Calls

Year	Input Price Growth Rates			Total Factor Productivity Growth Rates			LEC
	Total	U.S. Nonfarm	Differential	Total	U.S. Nonfarm	Differential	Price/Productivity
	RBOCs	Business Sector	C = B - A	RBOCs	Business Sector	F = D - E	Differential
A	B	C = B - A	D	E	F = D - E	G = C + F	
1986	5.20%	2.33%	-2.87%	2.84%	1.13%	1.71%	-1.16%
1987	0.73%	3.45%	2.72%	3.14%	-0.44%	3.58%	6.30%
1988	-1.37%	5.02%	6.39%	0.33%	0.23%	0.10%	6.49%
1989	-2.38%	2.42%	4.80%	1.93%	0.18%	1.74%	6.54%
1990	1.87%	3.31%	1.44%	6.85%	-0.62%	7.47%	8.91%
1991	-0.69%	1.77%	2.46%	2.19%	-1.40%	3.59%	6.05%
1992	2.80%	3.15%	0.35%	4.44%	1.67%	2.77%	3.13%
1993	2.48%	2.18%	-0.30%	4.01%	0.20%	3.81%	3.51%
1994	-0.05%	3.37%	3.42%	2.35%	0.27%	2.08%	5.50%
1995	1.23%	2.61%	1.38%	5.12%	-0.17%	5.29%	6.67%
1996	8.58%	3.00%	-5.59%	9.01%	0.90%	8.12%	2.53%
1997	-1.69%	2.86%	4.55%	1.20%	0.57%	0.62%	5.17%
Averages							
[1987-95]	0.51%	3.03%	2.52%	3.37%	-0.01%	3.38%	5.90%
[1987-97]	1.05%	3.01%	1.97%	3.69%	0.13%	3.56%	5.53%
[1993-97]	2.11%	2.80%	0.69%	4.34%	0.36%	3.98%	4.67%

Columns B and E are revised from the FCC study, based on revised BLS data.

Columns B and E for 1997 are estimated, based on the average of 1992-1996.

Column H obtained from Chart D4.

Column I obtained from Chart D11.

Chart D1-A: FCC LEC Price Cap X-Factor [Excluding CPD] based on Local Calls, 1985-95, DEMs, 1996-97

Year	Input Price Growth Rates			Total Factor Productivity Growth Rates			LEC
	Total RBOCs	U.S. Nonfarm Business Sector	Differential	Total RBOCs	U.S. Nonfarm Business Sector	Differential	Price/Productivity Differential
	A	B	C = B - A	D	E	F = D - E	G = C + F
1986	5.20%	2.33%	-2.87%	2.84%	1.13%	1.71%	-1.16%
1987	0.73%	3.45%	2.72%	3.14%	-0.44%	3.58%	6.30%
1988	-1.37%	5.02%	6.39%	0.33%	0.23%	0.10%	6.49%
1989	-2.38%	2.42%	4.80%	1.93%	0.18%	1.74%	6.54%
1990	1.87%	3.31%	1.44%	6.85%	-0.62%	7.47%	8.91%
1991	-0.69%	1.77%	2.46%	2.19%	-1.40%	3.59%	6.05%
1992	2.80%	3.15%	0.35%	4.44%	1.67%	2.77%	3.13%
1993	2.48%	2.18%	-0.30%	4.01%	0.20%	3.81%	3.51%
1994	-0.05%	3.37%	3.42%	2.35%	0.27%	2.08%	5.50%
1995	1.23%	2.61%	1.38%	5.12%	-0.17%	5.29%	6.67%
1996	8.58%	3.00%	-5.59%	11.64%	0.90%	10.74%	5.15%
1997	-1.69%	2.86%	4.55%	5.67%	0.57%	5.10%	9.65%
Averages							
[1987-95]	0.51%	3.03%	2.52%	3.37%	-0.01%	3.38%	5.90%
[1987-97]	1.05%	3.01%	1.97%	4.33%	0.13%	4.21%	6.17%
[1993-97]	2.11%	2.80%	0.69%	5.76%	0.36%	5.40%	6.09%

Columns B and E are revised from the FCC study, based on revised BLS data.

Columns B and E for 1997 are estimated, based on the average of 1992-1996.

Chart D1-B: Components of Interstate LEC Price Cap X-Factor [Excluding CPD], FCC Method

Year	Input Price Growth Rates			Total Factor Productivity Growth Rates			LEC
	Total RBOCs	U.S. Nonfarm Business Sector	Differential	Total Interstate TFP at RBOCs	U.S. Nonfarm Business Sector	Differential	Price/Productivity Differential
	A	B	C = B - A	D	E	F = D - E	G = C + F
1986	5.20%	2.33%	-2.87%	4.53%	1.13%	3.40%	0.53%
1987	0.73%	3.45%	2.72%	6.71%	-0.44%	7.14%	9.86%
1988	-1.37%	5.02%	6.39%	8.54%	0.23%	8.31%	14.70%
1989	-2.38%	2.42%	4.80%	2.74%	0.18%	2.56%	7.36%
1990	1.87%	3.31%	1.44%	12.36%	-0.62%	12.98%	14.42%
1991	-0.69%	1.77%	2.46%	7.77%	-1.40%	9.17%	11.63%
1992	2.80%	3.15%	0.35%	6.66%	1.67%	5.00%	5.35%
1993	2.48%	2.18%	-0.30%	10.51%	0.20%	10.31%	10.01%
1994	-0.05%	3.37%	3.42%	5.98%	0.27%	5.70%	9.12%
1995	1.23%	2.61%	1.38%	9.01%	-0.17%	9.18%	10.56%
1996	8.58%	3.00%	-5.59%	13.13%	0.90%	12.23%	6.64%
1997	-1.69%	2.86%	4.55%	6.06%	0.57%	5.49%	10.04%
Averages							
[1987-95]	0.51%	3.03%	2.52%	7.81%	-0.01%	7.82%	10.33%
[1987-97]	1.05%	3.01%	1.97%	8.13%	0.13%	8.01%	9.97%
[1993-97]	2.11%	2.80%	0.69%	8.94%	0.36%	8.58%	9.27%

Columns B and E are revised from the FCC study, based on revised BLS data.

Columns B and E for 1997 are estimated, based on the average of 1992-1996.

Column H obtained from Chart D4.

Column I obtained from Chart D11.

Chart D1-C: Components of Interstate LEC Price Cap X-Factor [Excluding CPD], FCC Method Adj, for Separations

Year	Input Price Growth Rates			Total Factor Productivity Growth Rates			LEC
	Total RBOCs	U.S. Nonfarm Business Sector	Differential	Total Interstate TFP at RBOCs	U.S. Nonfarm Business Sector	Differential	Price/Productivity Differential
	A	B	C = B - A	D	E	F = D - E	G = C + F
1986	5.20%	2.33%	-2.87%	6.15%	1.13%	5.02%	2.15%
1987	0.73%	3.45%	2.72%	7.85%	-0.44%	8.29%	11.01%
1988	-1.37%	5.02%	6.39%	8.42%	0.23%	8.19%	14.58%
1989	-2.38%	2.42%	4.80%	2.99%	0.18%	2.80%	7.60%
1990	1.87%	3.31%	1.44%	13.20%	-0.62%	13.82%	15.26%
1991	-0.69%	1.77%	2.46%	8.00%	-1.40%	9.40%	11.86%
1992	2.80%	3.15%	0.35%	7.45%	1.67%	5.79%	6.14%
1993	2.48%	2.18%	-0.30%	10.91%	0.20%	10.71%	10.41%
1994	-0.05%	3.37%	3.42%	5.88%	0.27%	5.61%	9.03%
1995	1.23%	2.61%	1.38%	9.30%	-0.17%	9.46%	10.84%
1996	8.58%	3.00%	-5.59%	14.43%	0.90%	13.53%	7.95%
1997	-1.69%	2.86%	4.55%	5.94%	0.57%	5.36%	9.91%
Averages							
[1987-95]	0.51%	3.03%	2.52%	# 8.22%	-0.01%	8.23%	10.75%
[1987-97]	1.05%	3.01%	1.97%	# 8.58%	0.13%	8.45%	10.42%
[1993-97]	2.11%	2.80%	0.69%	# 9.29%	0.36%	8.94%	9.63%

Columns B and E are revised from the FCC study, based on revised BLS data.

Columns B and E for 1997 are estimated, based on the average of 1992-1996.

Column H obtained from Chart D4.

Column I obtained from Chart D11.

Chart D2: RBOC Interstate Revenues

	End User	Interstate Switched Access	Special Access	Total Interstate
	A	B	C	D = A + B + C
Year				
1985	\$1,499,413,893	\$10,906,203,190	\$1,960,688,644	\$14,366,305,727
1986	\$2,400,475,814	\$10,484,265,170	\$2,574,800,716	\$15,459,541,700
1987	\$3,090,639,929	\$9,611,996,187	\$2,857,677,439	\$15,360,313,555
1988	\$3,604,221,000	\$9,662,529,000	\$2,539,698,000	\$15,806,448,000
1989	\$4,396,692,000	\$9,092,575,000	\$2,253,922,000	\$15,745,189,000
1990	\$4,679,142,000	\$8,595,750,000	\$2,209,064,000	\$15,483,956,000
1991	\$4,828,177,000	\$8,514,130,000	\$2,119,037,000	\$15,461,344,000
1992	\$4,963,262,000	\$8,650,880,000	\$2,153,565,000	\$15,767,707,000
1993	\$5,244,094,000	\$8,999,065,000	\$2,097,997,000	\$16,341,156,000
1994	\$5,589,662,000	\$9,293,783,000	\$2,217,125,000	\$17,100,570,000
1995	\$5,770,285,000	\$9,332,869,000	\$2,529,867,000	\$17,632,821,000
1996	\$5,930,960,000	\$9,409,639,000	\$3,070,598,000	\$18,411,197,000
1997	\$6,263,026,000	\$9,763,315,000	\$3,351,028,000	\$18,882,869,000
	L154	L155	L156	
1996 rev. shares				
Source: SOCC, Table 2.9:				

Chart D3: RBOC REVENUES (Excluding Miscellaneous Services)

	Local Service	Intrastate Toll and Intrastate Access	Interstate	Total
	A	B	C	D = A + B + C
Year				
1985	\$26,960,554,164	\$13,047,096,682	\$14,366,305,727	\$54,373,955,573
1986	\$28,626,174,049	\$13,538,946,796	\$15,459,541,700	\$57,624,662,544
1987	\$29,150,842,991	\$14,166,723,124	\$15,360,313,555	\$58,677,879,670
1988	\$29,226,988,000	\$14,994,976,000	\$15,806,448,000	\$60,028,411,000
1989	\$29,973,157,000	\$14,868,219,000	\$15,745,189,000	\$60,586,565,000
1990	\$30,699,085,000	\$15,014,729,000	\$15,483,956,000	\$61,197,770,000
1991	\$32,059,008,000	\$14,522,276,000	\$15,461,344,000	\$62,042,628,000
1992	\$33,369,990,000	\$14,225,181,000	\$15,767,707,000	\$63,352,878,000
1993	\$34,598,957,000	\$14,496,831,000	\$16,341,156,000	\$65,436,944,000
1994	\$35,758,637,000	\$14,365,983,000	\$17,100,570,000	\$67,215,190,000
1995	\$37,684,860,000	\$13,123,225,000	\$17,632,821,000	\$68,440,906,000
1996	\$40,523,387,000	\$12,987,476,000	\$18,411,197,000	\$71,922,060,000
1997	\$42,460,592,000	\$12,308,613,000	\$18,882,869,000	\$73,652,074,000
	L153	L157 + L174		
1996 rev. shares				
Source: SOCC, Table 2.9:				

Chart D4: Calculation of Fisher Ideal Index for Interstate Output

Year	Revenue Shares			Quantities			Output Indices			Interstate Output Quantity Index	Growth
	End User	Interstate	Special	Access	Switched	Special	Laspeyres	Paasche	Fisher		
		Switched Access:	Access	Lines	Access Minutes	Access Lines	A	B	Relative C=(A*B)*0.5		
1985	10.44%	75.92%	13.65%	92,671,959	156,853,820,000	1,230,590	1.000000	1.000000	1.000000	1.000000	
1986	15.53%	67.82%	16.66%	95,333,884	157,302,701,000	1,684,101	1.053249	1.052253	1.052751	1.052751	5.14%
1987	20.12%	62.58%	17.30%	98,228,585	173,154,171,000	1,754,445	1.063098	1.078813	1.060953	1.137975	7.78%
1988	22.80%	61.13%	16.07%	98,270,787	187,663,836,000	2,731,817	1.144443	1.114960	1.129605	1.285462	12.19%
1989	27.94%	57.75%	14.31%	101,190,050	210,406,134,000	2,449,090	1.065766	1.058920	1.062338	1.365595	6.05%
1990	30.22%	55.51%	14.27%	103,857,988	231,960,296,000	3,518,006	1.129086	1.114500	1.121769	1.531882	11.49%
1991	31.23%	55.07%	13.71%	107,383,307	248,710,162,000	5,161,899	1.111811	1.094856	1.103301	1.690127	9.83%
1992	31.48%	54.86%	13.66%	108,938,065	262,187,666,000	6,033,139	1.062516	1.060258	1.061386	1.793878	5.96%
1993	32.09%	55.07%	12.84%	112,196,681	278,173,161,000	10,153,615	1.136148	1.102619	1.119258	2.007812	11.27%
1994	32.69%	54.35%	12.97%	115,264,881	299,342,017,323	13,824,365	1.095119	1.066800	1.090952	2.190425	8.71%
1995	32.72%	52.93%	14.35%	119,867,506	334,981,582,000	16,107,677	1.101268	1.099925	1.100596	2.410774	9.59%
1996	32.21%	51.11%	16.68%	125,333,998	362,802,512,000	20,778,180	1.100080	1.099384	1.099732	2.651206	9.51%
1997	33.19%	46.41%	20.39%	131,458,355	366,566,932,000	27,891,558	1.106648	1.106527	1.106587	2.933790	10.13%
Sources:										Average [1987-95]	9.21%
Access lines (excluding mobile) and special access lines from SOCC, Table 2.10										Average [1987-97]	9.32%
Switched access minutes from SOCC, Table 2.20 (Common Line)										Average [1993-97]	9.84%

Chart D5: Calculation of Fisher Ideal Index for Total Company Output Based on Local Calls, 1985-97

Year	Revenue Shares			Quantities			Output Indices			Total Company Output Index	Growth
	Local Service	Intrastate Toll and Intrastate Access	Interstate	Number of Local Calls	Intrastate DEMs	Interstate Quantity Index	Laspeyres	Paasche	Fisher Relative		
							A	B	C=(A*B)*0.5		
1985	49.58%	24.00%	26.42%	310,696,999,600	164,191,177,000	1.000000	1.000000	1.000000	1.000000	1.000000	
1986	49.68%	23.50%	26.83%	315,839,746,231	173,173,536,000	1.052751	1.035272	1.034895	1.035083	1.035083	3.45%
1987	49.68%	24.14%	26.18%	320,735,770,416	183,597,411,000	1.137975	1.043561	1.042639	1.043100	1.079696	4.22%
1988	48.69%	24.98%	26.33%	316,724,164,964	191,904,837,000	1.285462	1.041736	1.039449	1.040592	1.123522	3.98%
1989	49.47%	24.54%	25.99%	330,212,044,784	207,296,177,000	1.365595	1.054001	1.053389	1.053695	1.183850	5.23%
1990	50.16%	24.53%	25.30%	342,403,640,664	217,913,904,000	1.531862	1.062478	1.060759	1.061618	1.256797	5.98%
1991	51.67%	23.41%	24.92%	353,219,571,000	219,713,721,000	1.690127	1.044009	1.042632	1.043420	1.311367	4.25%
1992	52.66%	22.45%	24.89%	365,468,629,000	224,278,538,000	1.793878	1.036080	1.036005	1.036042	1.361254	3.73%
1993	52.87%	22.15%	24.97%	376,895,406,000	227,548,869,000	2.007812	1.049556	1.048164	1.048860	1.427765	4.77%
1994	53.20%	21.36%	25.44%	392,601,076,000	235,362,364,000	2.190425	1.052215	1.052028	1.052121	1.502182	5.06%
1995	55.06%	19.17%	25.76%	409,363,799,000	246,526,639,000	2.410774	1.058829	1.058314	1.058572	1.590167	5.69%
1996	56.34%	18.06%	25.60%	422,262,867,000	263,719,641,000	2.651206	1.056057	1.054739	1.055398	1.678259	5.39%
1997	57.65%	16.71%	25.64%	437,613,306,121	273,526,579,891	2.933790	1.054483	1.053640	1.054061	1.768988	5.27%
SOCC, Table 2.10											
										Average [1987-95]	4.77%
										Average [1987-97]	4.87%
										Average [1993-97]	5.24%

Chart D4-A: Calculation of Fisher Ideal Index for Total Company Output Based on Local Calls, 1985-96, DEMs 1996-97

Year	Revenue Shares			Quantities			Output Indices			Total Company Output Index	Growth
	Local Service	Intrastate Toll and Intrastate Access	Interstate	Local Service Index Calls 1985-95, DEMs 1996-97	Intrastate DEMs	Interstate Quantity Index	Laspeyres	Paasche	Fisher Relative		
							A	B	C=(A*B)*0.5		
1985	49.58%	24.00%	26.42%	1.000000	164,191,177,000	1.000000	1.000000	1.000000	1.000000	1.000000	
1986	49.68%	23.50%	26.63%	1.016552	173,173,536,000	1.052751	1.035272	1.034895	1.035083	1.035083	3.45%
1987	49.68%	24.14%	26.18%	1.032310	183,597,411,000	1.137975	1.043561	1.042639	1.043100	1.079696	4.22%
1988	48.69%	24.98%	26.33%	1.025836	191,904,837,000	1.285462	1.041736	1.039449	1.040592	1.123522	3.98%
1989	49.47%	24.54%	25.99%	1.062811	207,298,177,000	1.365595	1.054001	1.053369	1.053695	1.183850	5.23%
1990	50.16%	24.53%	25.30%	1.102051	217,913,904,000	1.531882	1.062478	1.060759	1.061618	1.256797	5.98%
1991	51.67%	23.41%	24.92%	1.136862	219,713,721,000	1.690127	1.044009	1.042832	1.043420	1.311367	4.25%
1992	52.66%	22.45%	24.89%	1.175286	224,278,538,000	1.793878	1.038080	1.038005	1.038042	1.361254	3.73%
1993	52.87%	22.15%	24.97%	1.213386	227,540,869,000	2.007812	1.049556	1.048164	1.048860	1.427765	4.77%
1994	53.20%	21.36%	25.44%	1.263614	235,362,364,000	2.190425	1.052215	1.052028	1.052121	1.502182	5.08%
1995	55.06%	19.17%	25.76%	1.317630	246,926,539,000	2.410774	1.058829	1.058314	1.058572	1.590167	5.69%
1996	56.34%	18.06%	25.60%	1.424628	263,719,641,000	2.651206	1.083448	1.083460	1.083454	1.722873	8.02%
1997	57.65%	16.71%	25.64%	1.596967	273,526,579,891	2.933790	1.102159	1.102415	1.102267	1.899100	9.74%
										Average [1987-95]	4.77%
										Average [1987-97]	5.52%
										Average [1993-97]	6.66%

Chart D5-A: Calculation of Local Service Index Based on Local Calls, 1985-95, DEMs 1996-97

	Local Calls	Local DEMs (K)	State DEMs (K) Local + Intrastate	Local Service Index Calls 1985-95, DEMs 1996-7
1985	310,896,999,600	1,380,145,900		1.000000
1986	315,839,746,231	1,398,014,000		1.016552
1987	320,736,770,416	1,404,776,000		1.032310
1988	318,724,184,964	1,469,781,200	1,604,966,000	1.025836
1989	330,212,044,704	1,496,826,800	1,661,697,000	1.062811
1990	342,403,840,664	1,514,668,700	1,732,549,000	1.102051
1991	363,219,571,000	1,512,946,967	NA	1.136862
1992	365,468,629,000	1,558,762,543	1,739,948,000.00	1.176286
1993	376,995,406,000	1,640,600,472	NA	1.213386
1994	392,601,075,000	1,719,329,169	1,933,150,000.00	1.263614
1995	409,383,799,000	1,802,545,593	2,046,691,000.00	1.317630
1996	422,262,867,000	1,955,027,929	2,215,349,000	1.424628
1997		2,191,529,420	2,465,056,000	1.596967

Notes:

Local calls and intrastate DEMs for 1997 extrapolated based on 1991-1996 growth rate.

Local DEMs for 1985-90 from January 1992 Monitoring Report, Table 4.9

Local DEMs for 1991-1996 downloaded from FCC website.

State (combined local + intrastate) DEMs from ARMIS 4304, Account 1216.

Local DEMs for total LEC industry (1985-88) from "Trends in Telephone Service", Table 11.1.

Local and intrastate DEMs for 1997 estimated on the basis of growth in state (local + intrastate) DEMs from 1996 to 1997.

Chart D6: Labor Input Price and Growth

RBOC	Total	Total	Labor Rate	Labor Price	Employment
Year	Employees	Compensation	Annual	Index	Growth
	A	B	C = B / A	(Base = 1985)	%Chg in A
1985	504,113	16,991,572,326	33,706	1.000000	
1986	482,698	16,728,435,454	34,656	1.028192	-4.34%
1987	477,714	16,978,905,847	35,542	1.054474	-1.04%
1988	466,827	17,030,359,791	36,481	1.082336	-2.31%
1989	461,149	16,910,660,694	36,671	1.087974	-1.22%
1990	443,105	17,586,868,921	39,690	1.177541	-3.99%
1991	414,467	17,186,211,200	41,467	1.230255	-6.68%
1992	411,167	17,160,988,000	41,737	1.238279	-0.80%
1993	395,639	17,956,438,000	45,386	1.346528	-3.85%
1994	367,196	17,154,284,000	46,717	1.386018	-7.46%
1995	346,643	16,203,522,000	46,717	1.386024	-5.70%
1996	338,040	18,467,448,000	54,601	1.619936	-2.57%
1997	338,177	17,461,673,000	51,605	1.531043	0.04%
				Average [1987-95]	-3.67%
				Average [1987-97]	-3.23%
				Average [1993-97]	-3.91%
*Sources:					
Column A: ARMIS data for total of full and part-time employees.					
Column B: SOCC, Table 2.9, Line 324					
Column A 1996: SOCC, Table 2.9, Line 321					

Chart D7: Summary of Capital Adjustments and Average Depreciation

Year	TPIS.BOY A	Unadj. Additions B	TPIS.EOY C	Adjustment		Adjusted Additions F = B * E	Adjusted EOY TPIS G = A+F-D	Depreciation Accruals H	Adjusted Depreciation Rate I=H/((A+G)/2)
				Retires D=A+B-C	Factor E				
1985	138,879,365	15,001,998	149,061,793	4,819,569	0.8880	13,321,774	147,381,569	10,241,376	7.155%
1986	149,061,793	14,842,725	159,010,189	4,894,328	0.8880	13,180,340	157,347,804	11,826,961	7.720%
1987	159,010,189	14,138,370	167,720,577	5,427,983	0.8880	12,554,872	166,137,079	13,311,655	8.188%
1988	168,505,114	14,284,742	175,860,216	6,929,640	1.0000	14,284,742	175,860,216	13,134,992	7.629%
1989	175,860,216	13,283,569	182,978,381	6,165,404	1.0000	13,283,569	182,978,381	13,420,810	7.480%
1990	182,978,381	14,478,334	187,168,695	10,286,020	1.0000	14,478,334	187,168,695	13,439,933	7.262%
1991	187,168,695	14,527,049	192,034,545	9,661,199	1.0000	14,527,049	192,034,545	13,200,593	6.962%
1992	192,034,545	14,611,866	196,411,915	10,234,496	1.0000	14,611,866	196,411,915	13,337,581	6.867%
1993	196,411,915	14,860,116	203,082,418	8,189,613	1.0000	14,860,116	203,082,418	14,032,782	7.025%
1994	203,082,418	14,717,999	209,325,562	8,474,855	1.0000	14,717,999	209,325,562	14,863,196	7.208%
1995	209,325,562	15,374,568	217,430,207	7,269,923	1.0000	15,374,568	217,430,207	15,358,563	7.198%
1996	217,430,207	18,026,150	227,317,120	8,139,237	1.0000	18,026,150	227,317,120	16,252,281	7.309%
1997	227,317,120	18,253,199	236,896,179	8,674,140	1.0000	18,253,199	236,896,179	16,667,034	7.181%
								Average [1985-95]	7.336%
								Average [1985-96]	7.334%
								Average [1985-97]	7.322%
Sources:									
Columns A, B, C and H are revised Form M data compiled by the Accounting and Audits Division of the FCC Common Carrier Bureau.									
Columns A, B, and C for 1996-97 are from the SOCC, Table 2.7, Account 260 - Account 2111.									
Column H for 1996-97 is from the SOCC, Table 2.9, Line 250 + Line 252.									
Column E is derived from Christensen's USTA Revised Stu:									

Chart D8: Construction of Materials Quantity Index

	Materials Price Index (1985=1.00)	Operating Expense	Depreciation & Amortization Expense	Employee Compensation	Materials Expense	Materials Quantity Index	Materials Quantity Index (1985 = 1.0)	Materials Quantity Index Growth
	A	B	C	D	E = B - C - D	F = E / A	G	H
Year								
1985	1.000000	40,953,072,435	10,024,710,656	16,991,572,326	13,936,789,453	13,936,789,453	1.000000	
1986	1.031346	42,424,084,849	11,592,001,248	16,728,435,454	14,103,648,147	13,674,991,862	0.981215	-1.90%
1987	1.063529	44,293,127,430	13,316,999,560	16,978,905,847	13,997,222,023	13,286,033,914	0.953307	-2.89%
1988	1.096392	46,809,139,000	13,646,937,000	17,030,359,791	16,131,842,209	14,849,006,812	1.065454	11.12%
1989	1.126234	48,600,813,000	13,860,101,000	16,910,850,694	17,829,861,306	15,831,400,318	1.135943	6.41%
1990	1.172025	49,544,744,000	13,931,615,000	17,586,868,921	18,026,360,079	15,380,525,227	1.103592	-2.89%
1991	1.204935	50,901,049,000	13,499,778,000	17,186,211,200	20,215,059,800	16,776,888,214	1.203784	8.69%
1992	1.234797	50,698,625,000	13,822,882,000	17,160,988,000	19,714,755,000	15,965,988,741	1.145600	-4.95%
1993	1.255352	52,786,635,000	14,244,514,000	17,956,438,000	20,565,683,000	16,382,403,501	1.175479	2.57%
1994	1.291436	55,916,863,000	15,068,058,000	17,154,284,000	23,694,521,000	18,347,421,785	1.316474	11.33%
1995	1.321671	56,831,094,000	15,556,284,000	16,203,522,000	25,071,288,000	18,969,386,481	1.361102	3.33%
1996	1.361400	57,884,494,000	16,377,242,000	18,457,448,000	23,049,804,000	16,930,956,368	1.214839	-11.37%
1997	1.395497	59,731,175,000	16,758,832,000	17,451,673,000	25,520,670,000	18,287,871,633	1.312201	7.71%
Source: SOCC		Table 2.8, L90	Table 2.8, L65	Table 2.9, L324			Average [1987-95]	3.64%
							Average [1987-97]	2.64%
							Average [1993-97]	2.72%
Sources:	Column A: Used data from USTA Comments (10/26/98), Attachment D, page A-8.							
	Column B: SOCC. 1985-87 Data adjusted by USTA Methodology shown in Chart 8a below.							
	Column C: SOCC							
	Column D: SOCC							

Chart D8a: Adjustments of 1985-87 RBOC Operating Expenses for Accounting Changes

	USTA Study				RBOC	
	Operating	Nonregulated	Capital/Expense	Shift	Operating	Adjusted
	Expense	Expense Adjustmte	Shift	Factor	Expense	Operating Exp.
	A	B	C	D = (A+B+C)/A	E	F = D * E
1985	46,223,368,251	406,886,403	1,985,079,714	1.05175	38,938,104,053	40,953,072,435
1986	48,113,849,487	471,112,072	1,959,363,711	1.05052	40,384,079,165	42,424,084,849
1987	49,562,282,080	1,089,570,002	1,908,791,665	1.06050	41,766,392,483	44,293,127,430
Sources:	Columns A-C: Christensen data from USTA Revised 1995 Study					
	Column E: SOCC					

Chart D9: Capital Quantity and Price Index Calculations

Year	Benchmark A	Adjusted Capital Additions B	BEA Composite Asset Price C	Capital Stock Quantity D	Capital Input Quantity E	Capital Input Quantity Growth F	Property Income /w Depreciation G	Capital Charge to Customers** H	Capital Customer Charge Index I (Base = 1985)	Capital Customer Charge Index Growth J	Capital Stock Quantity Current \$ K
1984		N/A		103,903,095							
1985	109,602,959	13,322,021	1.000000	109,602,959	1.000000		23,445,593,794	0.22565	1.00000		
1986		13,180,584	1.013181	114,571,594	1.054857	5.34%	26,792,578,943	0.24445	1.08333	8.00%	109,602,959
1987		12,555,105	1.030871	118,345,749	1.102677	4.43%	27,701,751,800	0.24179	1.07151	-1.10%	116,081,780
1988		14,284,742	1.035999	123,452,276	1.139001	3.24%	26,866,209,000	0.22701	1.00605	-6.30%	121,999,158
1989		13,293,569	1.075241	126,749,861	1.188148	4.22%	25,845,853,000	0.20936	0.92781	-8.10%	127,896,465
1990		14,476,334	1.092233	130,705,360	1.219885	2.64%	25,584,541,000	0.20185	0.89454	-3.65%	136,266,589
1991		14,527,049	1.108013	134,251,441	1.257955	3.07%	24,641,357,000	0.18853	0.83548	-6.83%	142,760,730
1992		14,611,866	1.111942	137,543,611	1.292083	2.68%	26,477,135,000	0.19722	0.87402	4.51%	148,483,857
1993		14,860,116	1.115963	140,769,370	1.323768	2.42%	26,914,823,000	0.19568	0.86720	-0.78%	152,940,485
1994		14,717,999	1.121307	143,568,283	1.354814	2.32%	26,366,385,000	0.18730	0.83006	-4.38%	157,093,400
1995		15,374,568	1.118892	146,801,609	1.381752	1.97%	27,166,096,000	0.18922	0.83656	1.02%	160,984,104
1996		18,026,160	1.122354	152,093,261	1.412870	2.23%	30,414,808,000	0.20718	0.91817	9.07%	163,961,512
1997		18,235,199	1.121372	157,197,209	1.463799	3.54%	30,679,731,000	0.20172	0.89394	-2.67%	170,702,494
						Average [1987-95]			Average [1987-95]	-2.85%	
						Average [1987-97]			Average [1987-97]	-1.75%	
						Average [1993-97]			Average [1993-97]	0.45%	

Notes:
 Column D equals prior year Capital Stock less depreciation (7.336%) plus Column B deflated by Column C.
 Column H equals Column G divided by 1000 times prior year Column D.

Chart D10: Factor Shares of Total Payments						
			Property Income /w Depreciation and Other Returns		Property Income w/o Depreciation	Total Factor Payment
Year	Labor Compensation	Materials Payment		Depreciation		
1985	\$16,991,572,326	\$13,936,789,453	\$23,445,593,794	\$10,024,710,656	\$13,420,883,138	\$54,373,955,573
1986	\$16,728,435,454	\$14,103,648,147	\$26,792,578,943	\$11,592,001,248	\$15,200,577,695	\$57,624,662,544
1987	\$16,978,905,847	\$13,997,222,023	\$27,701,751,800	\$13,316,999,560	\$14,384,752,240	\$58,677,879,670
1988	\$17,030,359,791	\$16,131,842,209	\$26,866,209,000	\$13,646,937,000	\$13,219,272,000	\$60,028,411,000
1989	\$16,910,850,694	\$17,829,861,306	\$25,845,853,000	\$13,860,101,000	\$11,985,752,000	\$60,586,565,000
1990	\$17,586,868,921	\$18,026,360,079	\$25,584,541,000	\$13,931,515,000	\$11,653,026,000	\$61,197,770,000
1991	\$17,186,211,200	\$20,215,059,800	\$24,641,357,000	\$13,499,778,000	\$11,141,579,000	\$62,042,628,000
1992	\$17,160,988,000	\$19,714,755,000	\$26,477,135,000	\$13,822,882,000	\$12,654,253,000	\$63,352,878,000
1993	\$17,956,438,000	\$20,565,683,000	\$26,914,823,000	\$14,244,514,000	\$12,670,309,000	\$65,436,944,000
1994	\$17,154,284,000	\$23,694,521,000	\$26,366,385,000	\$15,068,058,000	\$11,298,327,000	\$67,215,190,000
1995	\$16,203,522,000	\$25,071,288,000	\$27,166,096,000	\$15,556,284,000	\$11,609,812,000	\$68,440,906,000
1996	\$18,457,448,000	\$23,049,804,000	\$30,414,808,000	\$16,377,242,000	\$14,037,566,000	\$71,922,060,000
1997	\$17,451,673,000	\$25,520,670,000	\$30,679,731,000	\$16,758,832,000	\$13,920,899,000	\$73,652,074,000

Chart D-10-C: Supplemental Calculations for Separations

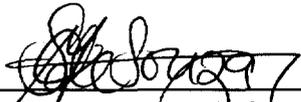
Total Factor Payment Separations Basis	Shares with Depr & Other Returns in Capital Weight			Shares with Only Depr in Capital Weight		
	Labor Compensation Share	Materials Payment Share	Capital Share	Labor Compensation Share	Materials Payment Share	Capital Share
\$40,953,072,435	31.25%	25.63%	43.12%	41.49%	34.03%	24.48%
\$42,424,084,849	29.03%	24.48%	46.49%	39.43%	33.24%	27.32%
\$44,293,127,430	28.94%	23.85%	47.21%	38.33%	31.60%	30.07%
\$46,809,139,000	28.37%	26.87%	44.76%	36.38%	34.46%	29.15%
\$48,600,813,000	27.91%	29.43%	42.66%	34.80%	36.69%	28.52%
\$49,544,744,000	28.74%	29.46%	41.81%	35.50%	36.38%	28.12%
\$50,901,049,000	27.70%	32.58%	39.72%	33.76%	39.71%	26.52%
\$50,698,625,000	27.09%	31.12%	41.79%	33.85%	38.89%	27.26%
\$52,766,635,000	27.44%	31.43%	41.13%	34.03%	38.97%	27.00%
\$55,916,863,000	25.52%	35.25%	39.23%	30.68%	42.37%	26.95%
\$56,831,094,000	23.68%	36.63%	39.69%	28.51%	44.12%	27.37%
\$57,884,494,000	25.66%	32.05%	42.29%	31.89%	39.82%	28.29%
\$59,731,175,000	23.69%	34.65%	41.65%	29.22%	42.73%	28.06%

Chart D11: Input Quantity Index

Year	Shares			Quantities			Quantity Indices				Growth
	Labor Compensation	Materials Payment	Property Income /w Depreciation	Labor	Materials	Capital	Laspeyers A	Paasche B	Fisher Relative C=(A*B)*0.5	Fisher Chain	
1985	31.25%	25.63%	43.12%	504,113	13,936,789,453	1.00000	1.00000	1.00000	1.00000	1.00000	
1986	29.03%	24.48%	46.49%	482,698	13,674,991,852	1.05486	1.00556	1.00666	1.00611	1.00611	0.61%
1987	28.94%	23.85%	47.21%	477,714	13,286,033,914	1.10268	1.01112	1.01058	1.01085	1.01703	1.08%
1988	28.37%	26.87%	44.76%	466,827	14,849,006,812	1.13900	1.03702	1.03728	1.03715	1.05481	3.65%
1989	27.91%	29.43%	42.66%	461,149	15,831,400,318	1.18815	1.03364	1.03356	1.03360	1.09025	3.30%
1990	28.74%	29.46%	41.81%	443,105	15,380,525,227	1.21989	0.99209	0.99063	0.99136	1.08083	-0.87%
1991	27.70%	32.58%	39.72%	414,457	16,776,888,214	1.25795	1.02121	1.02040	1.02080	1.10332	2.06%
1992	27.09%	31.12%	41.79%	411,167	15,965,988,741	1.29208	0.99283	0.99311	0.99297	1.09556	-0.71%
1993	27.44%	31.43%	41.13%	395,639	16,382,403,501	1.32377	1.00813	1.00711	1.00762	1.10392	0.76%
1994	25.52%	35.25%	39.23%	367,196	18,347,421,785	1.35481	1.02762	1.02772	1.02767	1.13446	2.73%
1995	23.68%	36.63%	39.69%	346,843	18,969,386,481	1.38175	1.00560	1.00589	1.00575	1.14098	0.57%
1996	25.66%	32.05%	42.29%	338,040	16,930,956,368	1.41287	0.96357	0.96529	0.96443	1.10040	-3.62%
1997	23.69%	34.65%	41.65%	338,177	18,287,871,633	1.46380	1.04103	1.04199	1.04151	1.14608	4.07%
										Average [1987-95]	1.40%
										Average [1987-97]	1.18%
										Average [1993-97]	0.90%

CERTIFICATE OF SERVICE

I, Cassandra M. de Souza, do hereby certify that I caused a copy of the foregoing Reply Comments of AT&T Corp. to Update and Refresh the Record to be served this 9th day of November, 1998, by First Class mail on all parties on the attached service list.



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