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November 8, 1996

Docket Control
Arizona Corporation Commission
1200 West Washington Street
Phoenix, AZ 85007

Re: In the Matter of the Petition of AT&T Communications of the Mountain States, Inc. for Arbitration of Interconnection Rates, Terms, and Conditions Pursuant to 47 U.S.C. § 252(b) of the Telecommunications Act of 1996, Docket No. U-2428-96-417, et al.

To The Commission:

I enclose for filing an original and ten copies of AT&T's rebuttal testimony in the above-referenced docket. Witness testimony from the following witnesses is contained in this package:

W. Les Johnson
R. Glenn Hubbard
Thomas M. Zepp

Please stamp one copy of this cover letter and return it to me by way of the messenger who delivered this original filing to the Commission.

Also enclosed in this package are replacement pages to correct an exhibit to Natalie Baker's witness testimony filed by AT&T on October 25, 1996. Please pass these pages on to those persons on the distribution list for AT&T's October 25, 1996 filing and ask that "NJB-1" to Natalie Baker's testimony be completely replaced with the revised NJB-1.

Thank you.

Sincerely,

Joan S. Burke

JSB:pjc
Enclosures
cc by hand delivery:
Gary L. Lane, U S WEST Law Department
Jerry L. Rudibaugh, Chief Hearing Officer, Arizona Corporation Commission
Gary Yaquinto, Director Utilities Division, Arizona Corporation Commission
Paul A. Bullis, Chief Counsel, Legal Division, Arizona Corporation Commission
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BEFORE THE ARIZONA CORPORATION COMMISSION

IN THE MATTER OF THE PETITIONS OF:	)	
	)	
AMERICAN COMMUNICATIONS SERVICES,	)	DOCKET NO. U-3021-96-448
INC. AND AMERICAN COMMUNICATIONS	)	DOCKET NO. U-3245-96-448
SERVICES OF PIMA COUNTY, INC.;	)	DOCKET NO. E-1051-96-448
	)	
AT&T COMMUNICATIONS OF THE	)	DOCKET NO. U-2428-96-417
MOUNTAIN STATES, INC.;	)	DOCKET NO. E-1051-96-417
	)	
MFS COMMUNICATIONS COMPANY, INC.;	)	DOCKET NO. U-2572-96-362
	)	DOCKET NO. E-1051-96-362
	)	
TCG PHOENIX;	)	DOCKET NO. U-3016-96-402
	)	DOCKET NO. E-1051-96-402
	)	
MCIMETRO ACCESS TRANSMISSION	)	DOCKET NO. U-3175-96-479
SERVICES, INC.;	)	DOCKET NO. E-1051-96-479
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BROOKS FIBER COMMUNICATIONS OF	)	DOCKET NO. U-3009-96-478
TUCSON, INC.;	)	DOCKET NO. E-1051-96-478
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SPRINT COMMUNICATIONS COMPANY, L.P.;	)	DOCKET NO. U-2432-96-505
and	)	DOCKET NO. E-1051-96-505
	)	
GST TUCSON LIGHTWAVE, INC.	)	DOCKET NO. U-3155-96-527
	)	DOCKET NO. E-1051-96-527
FOR ARBITRATION OF THE RATES, TERMS, AND CONDITIONS OF INTERCONNECTION WITH U S WEST COMMUNICATIONS, INC. PURSUANT TO § 252(b) OF THE TELECOMMUNICATIONS ACT OF 1996.	)	(Consolidated)

MAILING CERTIFICATE

AT&T REBUTTAL TESTIMONY

NOVEMBER 8, 1996

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The undersigned certifies that the ORIGINAL and TEN COPIES of AT&T's rebuttal testimony in the above-referenced docket were filed this 8th day of November, 1996, with:

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BEFORE THE ARIZONA CORPORATION COMMISSION

IN THE MATTER OF THE PETITIONS OF:	)	
	)	
AMERICAN COMMUNICATIONS SERVICES,	)	DOCKET NO. U-3021-96-448
INC. AND AMERICAN COMMUNICATIONS	)	DOCKET NO. U-3245-96-448
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DIRECT TESTIMONY OF

W. LES JOHNSON

ON BEHALF OF

AT&T COMMUNICATIONS OF THE MOUNTAIN STATES, INC.

NOVEMBER 8, 1996

I. BACKGROUND

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Les Johnson. My business address is 8142 E. Neville Ave., Mesa, Arizona.

Q. DID YOU PREVIOUSLY FILE TESTIMONY IN THIS DOCKET?

A. Yes. I filed direct testimony on October 25, 1996.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF THIS TESTIMONY?

A. The purpose of this testimony is to respond to supplemental direct testimony filed by U S WEST Communications, Inc. ("USWC") witnesses Susanne J. Mason, Dallas Elder, and William R. Eastman on November 1, 1996. I will discuss USWC's proposals, how those proposals are in no way compelled by the Eighth Circuit Court stay ("the stay") issued on October 15, 1996, and how those proposals are in conflict with both the Telecommunications Act of 1996 ("Act") and the rules adopted by the Arizona Corporation Commission ("Commission"). I also discuss the appropriate and lawful guidelines this Commission should use when evaluating the changes proposed by USWC. The USWC proposals addressed below are: (1) USWC's proposed inclusion of depreciation reserve deficiency as a cost for rate-making purposes for unbundled elements; and (2) USWC's use of embedded costs for rate-making.

III. IMPACT OF EIGHTH CIRCUIT STAY

Q. *DO YOU AGREE WITH USWC'S IMPLICIT INTERPRETATION OF THE COURT STAY?*

A. No. By filing testimony that outlines new cost and pricing proposals, USWC represents to this Commission that the stay invites this Commission to revise already adopted price cost methodologies. This is incorrect. USWC has made an inappropriate and unauthorized leap in concluding that this Commission should revisit pricing and costing decisions which were made prior to, and independent of, passage of the Federal Communication Commission ("FCC") Rules. First, the stay was just that -- a stay based on jurisdictional grounds -- and not a reversal of the FCC's interpretation of the Act and adopted rules. Further, the very premise of the stay is that the Act requires states, not the FCC, to ultimately determine prices. As the Eighth Circuit acknowledged and the Act requires:

> [S]ubsection 252(d), ... indicates that state commissions have authority to determine 'just and reasonable rates' necessary to implement the local competition provisions of the Act . . . [m]oreover, subsection 252(c)(2) directs state commissions to 'establish any rates for interconnection, services or network elements according to subsection (d) of this section.'

Under the Act, and according to the Eighth Circuit's order, the States are empowered to select cost and price methodologies to be used in establishing rates for interconnection, services and network elements.

IV. ARIZONA COMMISSION RULES

Q. HAS THE ARIZONA COMMISSION DEVELOPED A FRAMEWORK -- AS ANTICIPATED BY THE ACT -- FOR ESTABLISHING THE RATES NECESSARY TO IMPLEMENT LOCAL COMPETITION?

A. Yes. By developing and adopting the Competitive Telecommunications Rules (A.A.C. R14-2-1101 through R14-2-1115) and the Telecommunications Rules on Interconnection and Unbundling (A.A.C. R14-2-1301 through R14-2-1311), this Commission created a framework for establishing rates for interconnection services and unbundled network elements. USWC now submits to this Commission proposals that ignore and substantively violate these rules. It is interesting to note that while the stay recognized the authority of the states' own rate making, USWC failed to even acknowledge the Arizona Commission's rules in this regard.

V. USWC REQUEST FOR A SURCHARGE

Q. WHAT IS USWC SEEKING FROM THE COMMISSION

A. USWC has asked the Commission to approve a surcharge in addition to the TSLRIC cost calculation to be paid to USWC for alleged depreciation reserve deficiencies.

Q. WHAT DO THE ARIZONA COMMISSION RULES SAY ABOUT THIS PRICING PROPOSAL?

A. The Arizona Commission was very explicit when it adopted rules for pricing of interconnection services provided by incumbent LECs. A.A.C. Rule 14-2-1310(B)(1) states:

> Incumbent local exchange carriers shall establish the price of each interconnection service, including access to databases and other network functions as described in Rule R14-2-1306, at a level equivalent to its TSLRIC-derived costs which may include an assignment of verifiable indirect costs or a 10% addition for indirect costs to the TSLRIC direct costs at the choice of the incumbent LEC.

There is no ambiguity in the rule on pricing. The price is to be set at total service long-run incremental cost ("TSLRIC") which may include an assignment of verifiable indirect costs. There is no room in this rule for inflating the pricing by adding surcharges on top of the TSLRIC-based costs. Furthermore, USWC must prove that its purported TELRIC studies submitted in this arbitration comply with this rule.

Q. IS DEPRECIATION RESERVE DEFICIENCY TO BE INCLUDED IN TSLRIC STUDIES AS DEFINED IN THE COMMISSION'S RULES?

A. No, it is not. The Commission's rules, R14-2-1102, subsection 17, define TSLRIC as follows:

> The total additional cost incurred by a telecommunications company to produce the entire quantity of a service, given that the telecommunications company already provides all of its other services. Total Service Long run Incremental Cost is based on the least cost, most efficient technology that is capable of being implemented at the time the decision to provide the service is made.

Clearly, TSLRIC costs as defined by the Arizona Commission do not include plant that was installed years ago, how that plant was depreciated, how the rates for services using that plant were set, or what past earnings were attributable to that plant.

Q. DOES THE SURCHARGE PROPOSAL PUT FORWARD BY USWC CONFORM TO THESE ARIZONA COMMISSION RULES?

A. It does not, but instead clearly violates these Arizona rules. This is not a new issue. USWC opposed the pricing rules when they were adopted by the Commission. USWC is now asking the Commission -- under the guise of responding to the Eighth Circuit's stay -- to ignore the very specific rules adopted by the Commission for the costing and pricing of interconnection services. This proposal should be rejected.

Q. IS MR. EASTON'S TESTIMONY AND PROPOSAL ON DEPRECIATION CONSISTENT WITH THIS COMMISSION'S RULES?

A. No. In addition to the fact that this proposal violates the Commission's rules on pricing of interconnection services, this proposal also violates the Commission's rules on requesting changes in depreciation. In his testimony, Mr. Easton recognized that a reserve deficiency is addressed by increasing depreciation rates. The Arizona Corporation Commission, through its rules, has adopted procedures to be used when requesting a change in depreciation rates. Mr. Easton fails to follow or even mention these rules. In fact, his testimony, which amounts to a request for a depreciation rate change, violates the Arizona Commission's rule for such a filing.

Q. WHAT IS THE COMMISSION RULE WHICH ADDRESSES DEPRECIATION FILINGS?

A. Rule R14-2-102(C)(1) states:

> If a public service corporation seeks a change in its depreciation rates, it shall submit a request for such as part of a rate application in accordance with the requirements of R14-2-103.

Beyond this basic requirement, R14-2-102(C)(2) and (3) spell out the detailed description, data and analysis that is required to be included with any request to change depreciation rates.

Q. DOES THE USWC ALLEGED RESERVE DEFICIENCY CALCULATION, WHICH IS THE BASIS FOR THE SURCHARGE, COMPLY WITH THE ARIZONA COMMISSION RULES?

A. It does not. USWC totally ignores the Arizona Commission rules on depreciation and attempts to sidestep both R14-2-102 and R14-2-103. None of the supporting documentation required by R14-2-102(C)(2) and (3) are included with USWC's request for a depreciation rate change.

VI. USWC'S NEW EMBEDDED COST STUDY

Q. FOR WHAT PURPOSE DOES USWC SUBMIT ITS EMBEDDED COST STUDY?

A. USWC has submited an embedded cost study, by Mr. Dallas Elder, as "another view" to support its TELRIC cost-study for an unbundled loop.

Q. IS THERE AN ARIZONA COMMISSION RULE THAT IS RELEVANT TO THE FILING OF EMBEDDED COST RESULTS?

A. Yes, there is. Rule R14-2-1309 states:

> TSLRIC is the cost standard to be employed by the incumbent local exchange carrier in conducting the cost studies that establish the underlying cost of local exchange carrier services including unbundled essential facilities and services.

Clearly an embedded cost study is irrelevant since the rules by this Commission adopt only one cost study methodology, TSLRIC, for establishing the cost of local exchange carrier service. In adopting the TSLRIC methodology, the Arizona Commission rejected other cost methodologies, including the embedded cost study.

Q. CAN THE EMBEDDED COST STUDY RESULTS PROVIDED BY USWC BE USED IN CONFORMANCE WITH THE COMMISSION'S RULES?

A. No. The embedded cost study results are of no use to this Commission in its deliberations in this docket, since embedded costs are clearly not to be used as a basis for rate setting for essential elements, such as the loop. Mr. Elder's characterization of the embedded cost study results as "a more complete analysis" is a misleading attempt to validate an irrelevant submission.

Q. ARE THERE OTHER REASONS THAT THE EMBEDDED COST RESULTS AND THE ALLEGED DEPRECIATION RESERVE DEFICIENCY SHOULD BE REJECTED?

A. Yes. As discussed by Dr. Hubbard and already recognized by this Commission in its previously adopted rules, TSLRIC is the appropriate cost methodology to be used for rate setting. This was not a flip-of-the-coin judgment made by this Commission. This Commission's rules were the result of many months of study and review by the Commission Staff with careful consideration given to inputs from many parties. Numerous workshops were held where the issues were discussed and debated at length. The final result was a set of rules which reflected the Commission's policy decision to open the local exchange market to competition in a balanced way that would hold some hope of actual competitive entry. This attempt at one more bite at the apple by USWC, to change rules with which they disagree, should be summarily rejected.

Q. PLEASE SUMMARIZE YOUR TESTIMONY?

A. USWC has taken the opportunity brought about by a stay of certain FCC pricing rules to make various proposals which clearly ignore and violate numerous Arizona Commission rules. The Commission rules in question were, without exception, passed prior to the issuance of the FCC rules and were in no way derived from the FCC rules. Whatever the stay did or did not do regarding the FCC rules, it most certainly did not change the rules of the Arizona Corporation Commission. There is no reason given by USWC for this Commission to suddenly reverse many of its own rules, and the Commission certainly

should not do so. There are many legitimate issues which the Commission must decide in this docket. However, the proposals presented by Ms. Mason, Mr. Elder, and Mr. Easton in their November 1, 1996, filings are not legitimate issues. Costing and pricing methodology have already been decided and documented in Commission rules, and the USWC proposal is contrary to those rules. The method for depreciation rate changes is also documented in the Commission rules, and USWC should be directed to follow those rules if it wishes to change depreciation rates. The Commission adopted a policy favoring competition in local exchange service and adopted rules designed to implement that policy. Nothing has happened that would warrant, or even suggest, changing that policy and direction. The Commission should stay the course, deal with the legitimate issues, and reject the USWC proposals filed November 1, 1996.

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE ARIZONA CORPORATION COMMISSION

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AT&T COMMUNICATIONS OF THE	)	DOCKET NO. U-2428-96-417
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FOR ARBITRATION OF THE RATES, TERMS, AND CONDITIONS OF INTERCONNECTION WITH U S WEST COMMUNICATIONS, INC. PURSUANT TO § 252(b) OF THE TELECOMMUNICATIONS ACT OF 1996.	)	(Consolidated)

REBUTTAL TESTIMONY
OF
R. GLENN HUBBARD
on behalf of

AT&T COMMUNICATIONS OF THE MOUNTAIN STATES, INC.

November 8, 1996

REBUTTAL TESTIMONY OF R. GLENN HUBBARD

I. Background

Q. WHAT IS YOUR NAME AND ADDRESS?

A. My name is Robert Glenn Hubbard. My business address is 3022 Broadway, 101 Uris Hall, New York, New York 10027.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. My current position is Russell L. Carson Professor of Economics and Finance and Senior Vice Dean at the Graduate School of Business at Columbia University.

Q. HAVE YOU PREVIOUSLY PROVIDED TESTIMONY IN THIS MATTER?

A. Yes. I previously provided direct testimony in this matter which was filed on October 25, 1996.

II. Purpose of Testimony

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to respond to certain contentions made by Dr. Robert G. Harris and Susanne J. Mason on behalf of U S WEST Communications Inc. (U S WEST") in supplemental direct testimony which was filed on November 1, 1996.

Q. WHAT CONTENTIONS MADE BY DR. HARRIS AND MS. MASON DO YOU INTEND TO ADDRESS?

A. My testimony will address two contentions made by Dr. Harris and one assertion made by Ms. Mason. First, I address Dr. Harris' contention that The Arizona Corporation Commission ("Commission") should set prices for unbundled elements by including a mark-up above Total Element Long Run Incremental Cost (TELRIC) to allow U S WEST to recover embedded costs. Second, I address Dr. Harris' more specific contention that U S WEST's embedded costs include a depreciation reserve deficiency that U S WEST should be permitted to recover as an additional rate element added to the TELRIC price established for tandem and local switching. Finally, I address Ms. Mason's contention that it would be competitively neutral to recover the proposed additional depreciation reserve rate element on the basis of minutes of use passing through a U S WEST end office or tandem switch.

III. Rebuttal to Dr. Harris

Q. DO YOU AGREE WITH DR. HARRIS' CLAIM THAT U S WEST SHOULD BE ENTITLED TO RECOVER EMBEDDED COSTS BY MEANS OF A MARK-UP OVER THE TELRIC PRICE OF UNBUNDLED NETWORK ELEMENTS?

A. No. As I stated in my direct testimony, prices for unbundled network elements must be set at per unit TSLRIC (termed TELRIC by the Federal Communications Commission ("FCC")) to provide accurate signals to the market. (Hubbard Direct Testimony at pp. 21-23). Prices set above TSLRIC will deter market entry, preventing effective competition. This

Commission and the FCC have both recognized the need for efficient pricing based on TSLRIC. A.A.C. R14-2-1309, 1310(B); First Interconnection Order, ¶ 704-06. As U S WEST itself admitted in the Arizona interconnection workshop, TSLRIC studies must not reflect a company's embedded costs. See Ex. RGH-1 (Priniciple No. 7).

Q. DO YOU AGREE WITH DR. HARRIS' CLAIM THAT U S WEST HAS A DEPRECIATION RESERVE DEFICIENCY THAT IT SHOULD BE PERMITTED TO RECOVER BY MEANS OF AN ADDITIONAL RATE ELEMENT ADDED TO THE TELRIC PRICE FOR TANDEM AND LOCAL SWITCHING?

A. No, I disagree with Dr. Harris' claim on two grounds. First, there is no evidence to support a claim that U S WEST has a substantial depreciation reserve deficiency. Moreover, as I have indicated above, any mark-up over TELRIC will deter efficient market entry.

U S WEST has calculated its alleged depreciation reserve deficiency by comparing its book reserve to a theoretical reserve calculated using the depreciation lives it has advocated in this proceeding. See Supplemental Direct Testimony of William R. Easton at 3. As Dr. Zepp explained in his Direct Testimony on behalf of AT&T, U S WEST's proposed depreciation lives are significantly shorter than those adopted by this Commission and the FCC. It appears that U S WEST has chosen these improperly short depreciation lives to inflate its TELRIC estimates. See Direct Testimony of Thomas Zepp at 33-39. By basing the alleged depreciation reserve deficiency on these improperly short lives as well, U S WEST compounds their uneconomic price-raising effect.

Studies I have reviewed indicate that incumbent local exchange companies (ILECs) like US WEST have little true accumulated depreciation reserve deficiency. For example, a study of embedded investment done by Economics and Technology, Inc. and filed with the FCC in 1996 found that most of the ILECs' "embedded" plant was actually installed after 1990 and that the forward looking replacement cost of older plant could, in many cases, be higher than the embedded cost. See Ex. RGH-2 (pages 3-4). A 1995 study by Baseman and Van Geison determined that the depreciation reserve deficit as a fraction of gross book value for ILECs was less than 2%. Baseman and Van Geison, Depreciation Policy in the Telecommunications Industry: Implications for Cost Recovery by the Local Exchange Carriers. pp. 2-4 (Dec. 1995).

I have already testified to the anti-competitive effect of any mark-up to the TSLRIC price of unbundled network elements. U S WEST's proposal to recover its alleged depreciation reserve deficiency in the form of an additional rate element added to the TELRIC price for tandem and local switching is precisely the type of mark-up that will deter efficient entry into U S WEST's monopoly local exchange market.

IV. Rebuttal to Ms. Mason

Q. IS MS. MASON CORRECT IN HER ASSERTION THAT IT WILL BE COMPETITIVELY NEUTRAL TO RECOVER THE ALLEGED DEPRECIATION RESERVE DEFICIENCY BY SPREADING THE ALLEGED DEFICIENCY OVER ALL MINUTES OF USE PASSING THROUGH U S WEST'S TANDEM SWITCHES AND END OFFICES?

A. No. Ms. Mason is completely wrong in making this assertion. U S WEST intends to charge all new entrants an above-cost fee for tandem and local switching that it will not incur in providing service to its own customers. This is directly at odds with the fundamental premise of non-discrimination that underlies the Act and this Commission's Interconnection Rules. See 28 U.S.C. § 252(d)(A)(ii); A.A.C. R14-2-1112.

If new entrants are forced to incur costs for unbundled elements above those U S WEST incurs in providing the element, U S WEST will have both the ability and the incentive to discourage entry by undercutting new entrants' prices. Thus, accepting U S WEST's proposal for an additional above cost rate element will necessarily impede the development of competition in Arizona and rob Arizona consumers of some of the benefits of competition.

V. Recommendations

Q. WHAT RECOMMENDATIONS DO YOU HAVE FOR THE COMMISSION?

A. I recommend that the Commission reject U S WEST's proposal to recover its alleged depreciation reserve deficit by means of a fee to be added to the TSLRIC-based price derived for tandem and local switching. Both this Commission and the FCC have adopted TSLRIC/TELRIC as the appropriate basis for pricing unbundled network elements. TSLRIC pricing is necessary to encourage the development of competition in the Arizona local exchange market. Embedded costs are not appropriately part of any TSLRIC analysis.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes, it does.

U S WEST Communications, Inc.
3033 North Third Street Suite 1010
Phoenix, Arizona 85012
Office 602-630-8255
Fax 602-235-3107

Susanne J. Mason
Director - Regulatory Matters

U S WEST COMMUNICATIONS

October 11, 1995

Mr. Gary Yaquinto
Director - Utilities Division
Arizona Corporation Commission
1200 West Washington St.
Phoenix, Arizona 85007

Dear Gary:

Attached is a copy of the report developed by the industry interconnection workgroup. The following 11 companies participated in the workgroup meetings and had input into this work product: Citizens Utilities, Cox Cable, MCI, AT&T, Valley Telephone, New Vector Cellular, TCG, Sprint, ELI, ACSI, and U S WEST Communications.

In order to assist the Staff, we have submitted the report in the form of draft rules. These draft rules address a wide range of issues including those which were identified in the last Commission workshop in August. As we have discussed, the report indicates where the workgroup was able to reach consensus as well as where there is still a difference of opinion. In those instances where consensus was not reached, alternative options have been listed along with statements in support and/or opposition to the options.

The workgroup hopes that these proposed rules meet the Staff's expectations and will be useful as we move forward. Please call me if you have any questions or would like to discuss this information.

Sincerely,

Sue Mason RP

Proposed

Interconnection Rules

State of Arizona

Prepared by the

Arizona Interconnection Workgroup

October 11, 1995

ATTACHMENT A

CONSENSUS COSTING PRINCIPLES

Principle No. 1: ***Long run implies a period long enough that all costs are avoidable.***

Long run is a period of time long enough so that all costs are treated as avoidable. Variable is synonymous with volume-sensitive and therefore not synonymous with avoidable. Avoidable costs can include both volume-sensitive and volume-insensitive costs. The purpose of this principle is to preclude the possibility of cross-subsidization by ensuring that TSLRIC estimates include all costs necessary to provision a telecommunications service.

Principle No. 2: ***Cost causation is a key concept in incremental costing.***

Cost causation is a consistent and fundamental principle of TSLRIC studies. The principle of cost causation should be utilized to determine the appropriateness of including a cost in a TSLRIC study. The basic principle of cost causation is that only those costs that are caused by a cost object in the long run should be directly attributable to that cost object. Costs are considered to be caused by a cost object if the costs are brought into existence as a direct result of the cost object or, in the long run, can be avoided when the company ceases to provide the cost object.

For example, within the telecommunications industry, the principle of cost causation is best viewed from the standpoint of providing a service and what costs are necessary to offer that service. All costs caused by a decision to offer a service should be included in a TSLRIC study of that service.

Principle No. 3: ***The increment being studied shall be the entire quantity of the service provided, not some small increase in demand.***

1. TSLRIC studies for "disaggregated pieces"[1] of the LECs networks shall form the basis TSLRIC studies for LEC "services"[2] so that the results of

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[1] For purposes of this consensus item, the term "disaggregated piece" has been used in place of the terms "resource," "basic network function" and "basic network component/basic network element". Although not precisely defined here, "disaggregated pieces" refers to a higher level of aggregation than "nuts and bolts" items such as line cards, but (typically) a lower level of aggregation than tariffed LEC services. Some "disaggregated pieces" may, however, be offered as separately tariffed services in addition to being used as inputs to bundled LEC services.

the cost studies for "disaggregate pieces" will be blind to the "services" that use those pieces.

2. The TSLRIC study for each "disaggregated piece" shall use an increment of demand equal to the aggregate demand for that "disaggregated piece" across all its uses as an input to LEC services and, if applicable, as a separately tariffed LEC "service." The TSLRIC study for each "disaggregated piece" shall separately identify the volume-insensitive and volume sensitive costs for that "disaggregated piece", taking into account the entire aggregate demand for the "disaggregated piece."

3. The TSLRIC study for each LEC "service" shall include the volume-sensitive costs of shared "disaggregated pieces" and the total costs (both volume-sensitive and volume-insensitive) for all "disaggregated pieces" or functions that are dedicated uniquely to the LEC "service" being studied.

4 The TSLRIC study for each individual LEC "service" shall not include volume-insensitive costs of shared "disaggregated pieces." Instead, the TSLRIC for the group of services to share "disaggregated pieces" shall include the volume-insensitive cost of the shared "disaggregated pieces" plus all relevant volume-sensitive costs.

5. The total increment of demand at the "disaggregated piece" level is used to determine the size and the characteristics of the technology that shall be used to determine the TSLRIC.

The parties agree that this costing principle would produce costs that are relevant for determining whether cross-subsidization exists. All parties reserve the right to produce or request additional cost studies for other purposes and to identify other purposes for TSLRIC cost studies.

Principle No. 4. ***Any functions necessary to produce a service must have an associated cost.***

This principle assumes that any function necessary to produce an output or telecommunication service has an associated cost - whether that cost is volume-sensitive or volume-insensitive. The associated cost necessary to offer a service should in turn be included in a TSLRIC analysis. There shall be a presumption that no costs are sunk unless demonstrated to the contrary. The party seeking to demonstrate sunk costs has the burden of proof.

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[2] The term "services" refers to separately tariffed LEC service offerings or contracts, which may bundle together "disaggregated pieces" or may offer a single "disaggregated piece" for public purchase.

Principle No. 5: ***Common costs, if any, are not part of a TSLRIC study, except for a TSLRIC study of the firm as a whole.***

TSLRIC studies shall include costs that are often called overhead costs if those costs are caused by the decision to offer the cost object. TSLRIC studies of individual services shall exclude overheads that are not demonstrated to be caused by the cost objects. Recognition of such costs will be treated as a pricing issue. No cost shall be assumed to be volume-insensitive common costs on the basis of its accounting treatment.

Principle No. 6: ***Technology used in a long run incremental cost study shall be the least cost, most efficient technology that is currently available for purchase.***

This principle assumes that a TSLRIC analysis should be based on the existing or planned location of switching and outside plant facilities using the least-cost, most efficient technology. The least-cost technology should reflect a known and proven technology that is clearly identified and is in use, at least partially, today.

Principle No. 7: ***Costs shall be forward looking.***

TSLRIC studies shall be "forward looking"; i.e. they shall not reflect a company's embedded base of facilities. Rather, the study shall account for only the most efficient and cost-effective means of providing the service. Efficient requires that future costs be taken into account. Future costs must include all cost components required to provision a telecommunications service.

Principle No. 8: ***Cost studies shall be performed for the total output of specific services and will use as a basis the basic network functions which comprise the service plus all other service specific costs.***

The cost methodology implementation should ensure that costs for service which use the network in the same way are treated consistently in terms of the network functions contributing to their respective costs. Specifically, the parameters of volume, distance and duration, and time of day as to their effect on cost, should be consistently applied from service to service to the extent that the services use the network in the same way and to the same extent. For example, peak/off-peak cost differences shall be based on the aggregated usage patterns of all directly substitutable services within a given market.

Principle No. 9: ***The same long run incremental cost methodology shall apply to all services, new and existing, regulated and non-regulated, competitive and non-competitive.***

A TSLRIC study shall be based on a specific set of costing principles and data that yields consistent cost results that can be compared to all services, new and existing, regulated and non-regulated, competitive and non-competitive.

Types of Costs

Throughout this discussion, various costing terms have been used. These terms - such as "direct", "indirect", "common" and "joint" - have been taken from the two volume cost study report submitted to the Oregon Public Utility Commission (PUC) in Docket UM-351 (1993). This report identified the following types of costs associated with basic network functions:

Volume-sensitive costs - Costs that vary with changes in the output measured according to the cost drivers established for the output. (It is important to note that the term volume-sensitive is not synonymous with the terms usage-sensitive or traffic-sensitive).

Volume-insensitive costs - Costs that do not vary with changes in the quantity of output but are avoidable by not supplying the output.

Shared costs - Costs that are attributable to a group of outputs but not specific to any one within the group, which are avoidable only if all outputs within the group are not provided.

Service-specific costs - Costs, other than basic network function specific costs, that are caused by offering a service (e.g. service advertising).

Common costs - Costs that are common to all outputs offered by the firm. While the costs are not considered part of a TSLRIC study, recovery of such costs is required. Recovery of common costs is a pricing issue.

Inclusion of Annual Charge Factors

In Docket UM-351, the Oregon PUC adopted the use of factors and loadings as one of its main costing principles. Factors and loading are used when costs cannot be identified directly. Examples are operations and maintenance, depreciation, taxes and rate of return. These factors and loadings are an appropriate part of a TSLRIC study.

RGH - 2

ANALYSIS OF INCUMBENT LEC EMBEDDED INVESTMENT:

An Empirical Perspective on the "Gap" between Historic Costs and Forward-looking TSLRIC

Implementation of the Local Competition Provisions in the Telecommunications Act of 1996

CC Docket No. 96-98

Lee L. Selwyn
Patricia D. Kravtin

May 30, 1996

ECONOMICS AND TECHNOLOGY, INC.
ONE WASHINGTON MALL • BOSTON, MASSACHUSETTS 02108

Preface | ANALYSIS OF INCUMBENT LEC EMBEDDED INVESTMENT

In its *Notice of Proposed Rulemaking* (NPRM) adopted April 19, 1996 in CC Docket No. 96-98, the FCC's proceeding on implementation of the local competition provisions in the *Telecommunications Act of 1996* (the Act), the Commission sought comment, *inter alia*, on the empirical magnitude of the differences between historical costs incurred by incumbent LECs (ILECs) and the forward-looking long-run incremental costs (LRIC) of the services and facilities they will be providing pursuant to Section 251 of the Act.[1] The matter of such a differential was raised by the Commission in the context of rates that ILECs would set for interconnection, collocation, and unbundled network elements.[2] In comments submitted to the Commission, a number of ILECs (and/or their experts) assert that there is a significant "gap" between historical embedded "revenue requirement" costs and the forward-looking Total Service Long Run Incremental Cost (TSLRIC) of the services and facilities that the ILECs will be providing pursuant to Section 251, and that the failure to recover historic costs will have deleterious effects on the ILECs.

Economics and Technology, Inc. (ETI) was asked by AT&T to undertake an empirical analysis of the embedded investment of major ILECs to examine critically the notion being advanced by the ILECs that they carry on their books a large base of old, obsolete plant, acquired at a high cost relative to current prices. Furthermore, the ILECs claim that it is this old, obsolete plant that is responsible for creating a divergence between their embedded costs and TSLRIC. This report summarizes the results of ETI's analysis of ILEC embedded investment and the conclusions to be drawn therefrom. This project was conducted under the overall direction of Dr. Lee L. Selwyn and Patricia D. Kravtin, President and Vice President—Senior Economist, respectively, at ETI. Research and analytical support for this project was provided by Sonia N. Jorge, Michael J. DeWinter, Paul S. Keller, and Irena V. Tunkel, of ETI.

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1. NPRM, para. 144.

2. *Id.*

The time frame of the Commission's proceeding has necessarily limited the scope of the analysis we could reasonably perform in response to issues and questions as complex as those raised in the NPRM and in the Comments of the parties concerning the nature of ILEC investments and the "gap" between historical embedded costs and TSLRIC. Accordingly, we have concentrated our attention, at least initially, on the ILECs owned by the seven Regional Bell Holding Companies. Where data was available, we expanded the analysis to include larger independent telephone companies, such as Southern New England Telephone Company (SNET). In addition, as a result of recent work in several proceedings before the California Public Utilities Commission, we have benefitted from the availability of certain additional data and information regarding Pacific Bell's investment, plant replacement and depreciation practices, and have incorporated this knowledge, which we believe to be representative of ILECs in general, into these results. Although ETI's empirical analysis was necessarily constrained by the limited availability of ILEC data, we believe that the results we have obtained are representative across Tier 1 ILECs.

Economics and Technology, Inc.
Boston, Massachusetts

May 30, 1996

Table of Contents

ANALYSIS OF INCUMBENT LEC EMBEDDED INVESTMENT

Tables

1 INTRODUCTION AND SUMMARY

Purpose of this Study

In the FCC's *Notice of Proposed Rulemaking* (NPRM) in CC Docket No. 96-98 regarding the *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, adopted April 19, 1996, the Commission seeks comment, *inter alia*, on the empirical magnitude of the differences between the historical costs incurred by incumbent local exchange carriers (ILECs) (or historical revenue streams) and the forward-looking long-run incremental cost (LRIC)[1] of the services and facilities they will be providing pursuant to Section 251. The Commission further asks to what extent incumbent local exchange carriers can "reasonably claim an entitlement to recover a portion of such cost differences" in the rates set for interconnection, collocation, and unbundled network elements.[2]

In comments submitted to the Commission, the ILECs (and/or their experts) describe (but do not quantify) differences between historical embedded "revenue requirement" costs and the forward-looking Total Service Long Run Incremental Cost (TSLRIC) of the services and facilities that the ILECs will be providing pursuant to Section 251, and assert that the

1. The Commission uses the term Long Run Incremental Cost (LRIC) to refer generically to all types of forward-looking incremental costing methods. NPRM, para. 123. However, the Commission recognizes that some parties refer specifically to a "total service long-run incremental cost" approach. *Id.*, paras. 124-126. In this Report, we will hereinafter use the term TSLRIC, as the preferable type of long-run costing process that should be relied upon in the setting of interconnection and unbundled network element rates.

2. NPRM, para. 144.

failure to recover historic costs will have deleterious effects on the ILECs.[3] USTA presents the affidavit of Prof. Jerry A. Hausman, who argues that the recovery of ILEC historical embedded costs is required on the basis of "[p]roductive efficiency," i.e., to incent ILECs to continue to make efficient investments in their networks.[4] According to Prof. Hausman, TSLRIC does not permit the recovery of fixed and common costs, including "historical costs due to past network investments" in an "economically efficient manner."[5]

This Study responds to the points raised by the ILECS by examining both empirical and anecdotal evidence concerning the "gap" between historical embedded "revenue requirement" costs and bottoms-up aggregate TSLRIC results. In particular, this Study examines critically the notion, implicit in the arguments raised by the ILECs, that carried on their books is a relatively large base of old, obsolete, and relatively costly plant, responsible for creating a divergence from TSLRIC results that the ILECs are entitled to recover.

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3. For example, SBC Communications (SBC) argues that "incremental costs fail to account for certain ILEC costs historically incurred..." SBC Comments, p.89. Bell Atlantic asserts that "basing rates on incremental costs would deny LECs the ability to recoup any unrecovered historical investment." Bell Atlantic Comments, p. 36. BellSouth argues in its Comments that embedded costs "properly incurred pursuant to regulatory oversight" should be included in the measure of total costs that ILECs be permitted to recover in charges for interconnection and unbundled elements. BellSouth Comments, p. 57. Ameritech similarly argues that so-called "residual" costs, including costs associated with the "legacy of regulatory decisions" and with spare capacity, remain on the ILECs' books and cannot be ignored. According to Ameritech, these costs pertain to investments made to satisfy service obligations and which "encompass multiple generations of technology" such that "the resulting network will not be identical [i.e. will cost more relative] to the one that could be built today." Ameritech Comments, p. 68-70.

4. Affidavit of Jerry A. Hausman submitted with USTA Comments, para. 3.

5. *Id.*

Summary

On the basis of ETI's empirical analysis, we find that, as a general proposition, any "gap" between historical embedded costs and TSLRIC *cannot* be ascribed to either old/obsolete, or high cost plant, or to plant put in place to satisfy basic service demand as part of any explicit or implicit pre-competition regulatory condition imposed upon the ILECs.

In particular, what we see is that the majority of plant carried on the ILECs' books is relatively new, representing investments made by the ILECs during the 1990s – a time period in which fundamental regulatory changes, competitive inroads, and corresponding strategic responses, were clearly being contemplated and addressed by these companies. Moreover, of the plant acquired since January 1, 1990 that now constitutes the majority of most ILECs' net rate base, only a small fraction of the gross additions in digital switching and outside plant distribution facilities can be shown to have been required to support growth in basic service demand over this period. Furthermore, a large portion of the older (i.e., pre-1990) vintage plant remaining on the ILECs' books is associated with physical assets whose economic values may have actually appreciated, in that similar plant is still being acquired at reproduction costs (such as reflected in TSLRIC studies) that in many cases are likely to be *greater* than the original (historic) acquisition cost. Thus, rather than placing RBOCs at a competitive disadvantage relative to new entrants, the *composition* of the older plant remaining on the companies' books suggest that this older plant may actually represent "hidden" valuable assets for the ILECs.

The overall approach employed in this Study has as its foundation the following three basic premises:

- First, the potential entry of competition in the local exchange market has not (or should not have) taken the ILECs by surprise, but rather has been (or certainly should have been) contemplated by the ILECs in ongoing investment and construction planning over the past several years. Accordingly, for purposes of evaluating ILEC claims of entitlement to recover revenues based upon historic embedded costs, it is appropriate to distinguish between "historic" embedded costs incurred by the ILECs in recent years from the historic embedded costs associated with the earlier pre-local exchange competition era;

- Second, the only embedded costs for which the ILECs should be even remotely justified in making a claim for any sort of entitlement to recovery are those associated with the provision of basic telephony services that relate to a specific regulatory mandate under the traditional rate-of-return regulatory regime. Embedded costs associated with strategic ILEC investments in modernized facilities designed either to provide new non-basic services (e.g., advanced or

broadband digital) or to acquire excess capacity over and above that explained by demand growth for basic service are not relevant in the context of carrier-to-carrier interconnection rates; and

- Third, embedded costs associated with certain types of plant (e.g., copper cable, buildings) may actually represent "hidden" assets for the ILECs to the extent that the current reproduction costs of such plant (as would be reflected in TSLRIC studies) exceed the historic costs carried on the ILECs' books. That the ILECs in the current market environment prefer to deploy fiber cable to replace copper distribution cable, and digital switches to replace analog switches (creating an excess of building space, among other things) is similarly not germane, since those deployment choices can, as a general proposition, be linked to strategic positioning on the part of the ILEC to provide *non*-basic — and often *competitive* — services.

For these reasons, any attempt by ILECs to claim an entitlement to additional investment recovery over and beyond that supported by proper TSLRIC studies based upon the existence of a "gap" that can be attributed to newer, underutilized plant is not supportable on economic efficiency or public policy grounds. Indeed, the only purpose that would be served by granting ILECs additional revenue recovery based upon claims concerning any such "gap" would be to impose a significant competitive disadvantage upon new local exchange entrants.

To empirically test whether the conditions identified above regarding the vintage, composition, and utilization of plant are extant for the ILECs, several related empirical analyses were performed to examine trends in ILEC investment, depreciation, plant acquisition, retirement, and utilization, among other factors, for the period beginning January 1, 1990 to the present. As described in this Study, our empirical analyses demonstrate, with respect to the *vintage, composition, and utilization* of ILEC plant, that:

Vintage

- The overwhelming majority of ILEC plant is not particularly old or obsolete;
  - For the RBOCs, 60% of net Total Plant in Service (TPIS) as of the end of 1995 was acquired on or after January 1, 1990;
  - In the aggregate, newer vintage plant is replacing the older vintages at the steady pace of approximately 5%-10% per year (as a result of additions, retirements, and ongoing depreciation charges taken against existing plant), such that in the next several years, during the transition to a more competitive local exchange environment, the ILECs will have replaced or retired virtually

all categories of their pre-1990 embedded base of plant that has become economically and/or technologically obsolete;

- As early as the end of 1997, for example, for most RBOCs, only about 30% of net TPIS will be associated with older vintage plant.

Composition

- The composition of plant accounts — in terms of the proportion of surviving plant associated with older vs. newer vintages — varies with the type of plant and has significant implications with respect to the relative economic value of older versus newer vintage plant;
  - In particular, for plant accounts such as metallic (i.e., copper) cable, buildings, poles and conduit, for which current reproduction costs are higher than historic costs, there is a greater proportion (in the range of 70%) of pre-1990 vintage plant surviving in net TPIS;
  - In sharp contrast, for plant accounts such as non-metallic (i.e., fiber) cable, for which current costs are lower than historic, a markedly lower proportion of the plant (roughly half of that existing for metallic) is associated with older (i.e., pre-1990) vintages;
  - For a large portion of pre-1990 plant investment remaining on the RBOCs' books, historic embedded costs may be *lower* relative to current reproduction cost results.

Utilization

- ILEC additions to central office (CO) digital switching and outside plant facilities over the period January 1, 1990 through December 31, 1995 cannot be explained by basic service demand growth;
  - For the RBOCs, only between 12% to 37% of digital CO switching capacity that was added over the period January 1, 1990 through the end of 1995 can be characterized as demand driven, i.e., explained by growth in the demand for basic services;

- While there is a broader range of results across RBOCs, for some companies, the percentage of outside plant distribution facilities added between January 1, 1990 and the end of 1995 that can be explained by growth in demand for basic service ranges as low as –15.8% to 9%, where the "negative" utilization result indicates additional outside plant facilities were deployed despite experiencing an overall decline (i.e., negative growth) in basic service demand over the period;

- Even for companies at the "high" end, demand-driven outside plant utilization figures in the range of 66% to 82% suggest a substantial amount of historic investment that cannot be attributed to meeting basic service demand. For example, for BellSouth, an estimated loop plant utilization factor of 71% in conjunction with an estimated digital CO plant utilization factor of 34%, results in an estimated $2.9-billion in excess net plant relative to that required to satisfy growth in basic service demand over the 1990 to 1995 period;

- Of all the RBOCs, SBC Communications exhibits the highest (82%) outside plant utilization relative to that required to meet basic service demand growth, consistent with the generally unfavorable competitive climate for new entrants in its region, and its aggressive investments in cellular and other acquisitions. Conversely, companies exhibiting the lowest outside plant utilization, (Ameritech, NYNEX, and Bell Atlantic) operate in areas where regulatory and market conditions are relatively conducive to local competition;

- For RBOCs nationwide, we estimate in the order of magnitude of as much as $25-billion of historic net TPIS (as of the end of the 1995) that cannot be explained by basic service demand growth over the 1990 to 1995 period.

The time frame of the NPRM precludes the completion of a large number of data-intensive empirical analyses. However, this Study also examines several specific examples and other anecdotal evidence that further supports and expounds upon the conclusions of the quantitative empirical analyses. These include:

- ILEC involvement in the market for advanced Centrex-type services, which unlike POTS services, required the use of digital (as distinct from analog) central office switches, may have motivated the early replacement of analog central office switching plant, as well as the deployment of excess outside plant facilities;

- ILEC efforts to expand the market for additional residential lines and other discretionary services, required the ILEC to design and construct far more extensive feeder and distribution infrastructures (and expend far greater aggregate capital investments) than otherwise required to provision basic local exchange service, and appears to overwhelm simple growth in basic local exchange line demand as a principal capital investment driver; and

- ILEC strategic positioning in the market for advanced and broadband digital services has resulted in the ILECs significantly increasing feeder facilities relative to those actually required to meet demand for basic local exchange lines and other POTS services, and provides a far better explanation for capacity expansion than simple POTS demand growth.

2 STUDY APPROACH AND METHODOLOGY

General Study Approach

The overall approach utilized in this Study for purposes of evaluating ILEC claims of entitlement based upon historic embedded costs has as its foundation three basic premises:

(1) That the potential entry of competition in the local exchange market has not taken the ILECs by surprise, but rather has been (or certainly should have been) contemplated by the ILECs in ongoing investment and construction planning over these past several years;

(2) That the costs at issue are those incident to the provision of basic telephony services, and not those attributable to modernized facilities designed to support the offering of new non-basic and competitive services or to build in excess capacity over and above that required to serve basic service demand in anticipation of an expansion of business; and

(3) That embedded costs associated with certain types plant (e.g., copper cable, buildings) may actually represent "hidden" assets to the extent that the current reproduction costs of such plant (as would be reflected in TSLRIC studies) exceed the historic costs carried on the ILECs' books.

On this basis, the general approach adopted in this Study is to examine trends in ILEC investment, depreciation, plant acquisition, retirement and utilization, among other factors, based upon a distinction between "historic" embedded costs incurred by the ILECs in more recent years from the historic embedded costs associated with the pre-local exchange competition era.

For purposes of this Study, we have selected January 1, 1990 as the cutover point between "historic" and "current" ILEC operating environments. While there cannot be a bright line separating these two "eras," January, 1990 is a reasonable break-point for several

reasons. During the period 1990 to the present (if not before), the ILECs have argued for price cap regulation for interstate services and in a majority of intrastate jurisdictions largely on the premise that they needed increased pricing flexibility and earnings growth in order to respond successfully to increasing competition in all aspects of their business. The ILECs have been successful in their efforts during this period to get out from under rate of return regulation with its emphasis on historical embedded costs and to enjoy the increased freedom under price cap regulation to make market-driven decisions.[6] During this period, local competition and related issues have been addressed extensively in the federal jurisdiction and in a large number of state jurisdictions.

To empirically test whether the conditions identified above regarding the vintage, composition, and utilization of plant are extant for the ILECs, several related empirical analyses were performed to examine trends in ILEC investment, depreciation, plant acquisition, retirement, and utilization, among other factors, for the period beginning January 1, 1990 to the present. We rely upon the latest data available from ARMIS, supplemented with data from various state commission and FCC decisions, depreciation studies, and monitoring reports, as supported by our general industry knowledge.

Vintage Analysis

The ultimate goal of the vintage analysis is to demonstrate how much of the net investment was acquired by the ILECs during the period beginning on and after January 1, 1990. Accordingly, we develop a methodology that allows for the attribution or breakdown of each of these categories as between the pre-January 1, 1990 and post-January 1, 1990 periods: In other words, for each year, starting in 1990, we distinguish how much of the TPIS can be characterized as pre-1990 vis-a-vis post-1990 plant.

The vintage analysis tracks several specific categories of data with respect to Total Plant In Service (TPIS) for each RBOC starting with the year 1990:

- Beginning TPIS balance;
- Annual changes (additions, retirements, other adjustments);
- Ending TPIS balance;
- Beginning accumulated depreciation, accruals, ending accumulated depreciation;

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6. Over 70% of current ILEC revenue streams are regulated on the basis of "pure price caps" regulation. Merrill Lynch Report, "Telecom Services - Local," 23 April 1996.

- Composite depreciation rate; and
- Net TPIS.

The data used in the analysis was compiled or derived from various public sources: ARMIS Reports 4302 (Tables B1 and B5) were the source for all TPIS data including values for annual additions, retirements, other adjustments and accruals; various relevant state commissions and FCC decisions were the sources for depreciation rates; and generation arrangement tables provided by the ILECs to the FCC as part of their triennial depreciation filings were the source for survivorship percentages by plant vintage.

The methodology utilized in the vintage analysis can be summarized as follows: net pre-1990 TPIS consists of: all plant acquired before 1990, the portion of retirements related to pre-1990 plant vintages, depreciation accruals related to pre-1990 plant, other adjustments related to pre-1990 plant, and accumulated depreciation related to pre-1990 plant — derived on the basis of year-to-year tracking for each vintage plant. Correspondingly, net post-1990 TPIS consists of all plant acquired during and after 1990, offset by that portion of total retirements related to post-1990 plant vintages, depreciation accruals related to post-1990 plant, other adjustments related to post-1990 plant, and accumulated depreciation related to post-1990 plant. The pre-1990 TPIS amounts are typically derived as a residual, by subtracting the derived post-1990 amounts from the total TPIS amounts reported in ARMIS. Detailed spreadsheets following this methodology are presented in Appendix A to the Study.

The specific methodology used to assign categories to the pre- and post-1990 periods is described as follows:

Additions

The analysis assigns plant additions entirely to the post-1990 period, since assets added in each of the years beginning with 1990 through to the present are, by definition, post-1990 plant.

Retirements

Retirements apply to plant acquired before 1990 as well as to plant acquired after 1990, and accordingly, are attributed to both the pre-1990 and post-1990 periods. It is possible to estimate the portion of the total retirements charge attributable to each vintage of plant additions based upon generation arrangements data provided for each category of plant. In our analysis, retirements are attributed between the two periods based upon a weighted average survival curve derived from the survivorship data identified in the generation

arrangement tables described above. The weighted average curve considers the survival factors assigned to each plant account, properly weighted by each account's share of total investment. For simplification purposes, we selected seventeen TPIS categories of accounts to be included in our analysis.[7] These categories collectively account for over 90% of 1995 TPIS. The analysis resulted in a weighted average survival curve (yearly survival factors), which was then used to estimate the portion of retirements that relates to each vintage during the post-1990 period. For each year's retirement charge, we estimated the portion relating to the post-1990 period (using the survival curve to calculate each vintage's retirement expense) and subtracted that amount from the total retirement charge reported in ARMIS to derive the amount related to pre-1990 plant.

Accruals

The allocation of depreciation accruals to the pre- and post-1990 periods followed a similar method as that used for retirements. We derive a composite depreciation rate for each year in the post-1990 period using state- and FCC-prescribed rates. For example, for Pacific Bell, the California Public Utilities Commission (CPUC) allows depreciation rates to be adjusted on an annual basis, so the composite depreciation rates were generated for each year based upon annual CPUC-prescribed depreciation rates. In contrast, the Bell Atlantic companies only file depreciation rates on a triennial basis, with the state commissions generally adopting the depreciation rates approved by the FCC. For all companies, the composite rate was derived using a weighted average of the rates prescribed for each TPIS account, weighted according to the level of investment in each account. Composite depreciation rates were then estimated at the RBOC level for each year in the post-1990 period, by weighting the relevant state-level composite depreciation rates according to relative access line counts. For each RBOC, we utilized data that was readily available, and in all cases incorporated data for the largest state operations. The composite RBOC depreciation rate was then applied to the annual additions and to the net TPIS balance corresponding to the post-1990 period. The difference between the post-1990 accrual expense and the ARMIS reported depreciation expense determined the pre-1990 plant accrual expense. As with the retirement calculations, all balances were carried to the next year and considered in the following year's expense calculation.

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7. These categories include Buildings, General Purpose Computers, Analog Electronic Switches, Digital Electronic Switches, Digital Electronic Switches, Digital Circuit, Analog Circuit, Poles, Aerial Cable Metallic Exchange, Aerial Cable Metallic Interoffice, Aerial Cable Non-metallic Exchange, Underground Cable Metallic Exchange, Underground Cable Metallic Interoffice, Underground Cable Non-metallic Interoffice, Buried Cable Metallic Exchange, Buried Cable Metallic Interoffice, and Buried Cable Non-metallic Interoffice, and Conduit.

Other Adjustments

The category "Other Adjustments" in the Depreciation section (ARMIS Form 43-02, Table B-5) includes Salvage, Other Credits, Cost of Removal, Other Charges and any discrepancy in Retirements. These amounts generally related to retirements and accordingly were allocated as between pre-1990 and post-1990 periods in proportion to retirements. Similarly, where there existed non-zero entries in the "Transfers/Adjustments" column in the calculation of the ending TPIS balance (ARMIS Form 43-02 Table B-1), that amount was also allocated in proportion to retirements.

The vintage analysis worksheets are reproduced in Appendix A to this Study.

Composition Analysis

While the vintage analysis described above examines ILEC embedded investment at the aggregate TPIS level, the composition analysis uses the *plant-specific data* provided in the generation arrangement tables (submitted by the ILECs to the FCC as part of their depreciation filings[8]) in order to answer the question of how the composition of plant accounts — in terms of the proportion of surviving plant associated with older vs. newer vintages — varies with the type of plant, and to examine the implications of any observed variation in terms of its impact upon the "gap" between historic embedded costs and TSLRIC results.

To the extent it can be shown that for copper plant accounts there is a greater proportion of older vintage plant surviving vis-a-vis the results for net TPIS, this effectively rebuts the notion that older vintage ILEC plant is comprised of more costly plant relative to that which would be costed out under TSLRIC. As another example, building space freed up by the lower space requirements of digital switching equipment vis-a-vis the analog equipment it replaces has significant revenue generating potential for the ILECs, particularly in the context of the demand for collocation. Thus, similar to the case of copper plant, building plant accounts would provide another prime example of valuable older vintage assets.

For this study, we have examined generation arrangement data for the principal plant accounts for one representative state operating area (the largest based upon number of access lines) per RBOC. Based upon our examination of the generation arrangement data,

8. As noted above, the data provided in the generation arrangements information was also used in the vintage analysis as the source of plant survivorship curves from which pre- and post- 1990 retirements were estimated.

we observe a consistent trend across ILECs with respect to survivorship percentages for various plant categories.

The composition analysis is performed directly from the information provided by ILEC generation arrangement tables. The generation arrangement table identifies for each plant account the proportion of plant surviving for each year, as well as the total amount surviving for that particular plant account. In general terms, we estimate the amount of post-1990 plant surviving on the ILEC's books by simply adding together the respective amounts of surviving plant identified in the generation arrangement table for each of the years 1990 through 1995. An estimate of the pre-1990 plant is derived by subtracting the post-1990 estimate from the total amount surviving. The analysis is performed on plant account categories that together comprise generally over 90% of RBOC TPIS.[9]

Before doing these calculations, however, two intermediate steps are required. In order to minimize data requirements, we first combine the various disaggregated plant account categories into a single composite category. For example, the various cable (e.g., aerial, buried, and underground) accounts are combined into a composite cable category. Second, for most companies, the latest data available is for the year 1994. To estimate the post-1990 surviving plant through the end of 1995, consistent with the study period covered by our analysis, we estimate surviving amounts for 1995 (and in the case of Pacific Bell for 1994 as well) by applying the average annual growth rate for the most recent three year period.

The composition analysis worksheets are reproduced in Appendix B to this Study.

Utilization Analysis

The purpose of the utilization analysis is to further examine the post-1990 investment in order to determine what portion of aggregate RBOC investment could actually be attributed to meeting growth in demand for basic service. To the extent that a large portion of investments in central office and/or outside plant can be shown to be underutilized relative to that required to meet POTS (for Plain Old Telephone Service) access line growth demand, it would suggest that such investments may have been motivated by strategic considerations rather than growth-driven requirements associated with the provision of basic services (and hence not appropriately recovered in the rates for carrier-to-carrier interconnection and unbundled elements).

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9. These categories are the same ones used in the development of survival curves in the vintage analysis and are identified in footnote 7, *supra*.

The utilization analysis is developed based upon a combination of data from ARMIS and from deployment and utilization forecasts submitted to the FCC and to state PUCs. The analysis consists of three basic steps:

- First, we derive estimates of the percentage of digital CO and loop plant additions, respectively, that can be explained by basic demand growth;
- Second, the "utilization" percentages estimated in the preceding step are applied to annual plant additions (and corresponding retirements) for the post-1990 period to derive an estimate of the amount of plant additions in the 1990 to 1995 period that are "demand-driven," i.e., that can be explained by demand growth for basic service; and
- Third, those revised plant additions and retirements are run through the vintage model to produce a revised net TPIS result as of the end of 1995, the objective of which is to more closely track what ILEC net TPIS would have been had ILEC plant acquisition been driven solely by basic service demand growth.

Determination of utilization levels for digital CO and loop plant

We first determine the percentage of digital CO capacity and loop plant that can be explained by demand growth for basic service. Data available from ARMIS Form 43-07 on "Total Number of Access Lines in Service"[10], adjusted to remove all but the PBX trunk-equivalent measure of non-basic Centrex lines,[11] is used as the measure of basic demand growth relating to digital CO capacity. "Total Working Channels" data, similarly adjusted to remove non-basic Centrex lines, is used as the measure of basic demand growth relating

10. As described in ARMIS Report Definitions, Row 120 - *Total Number of Access Lines In Service* - is equal to the sum of rows 140 *E/M Lines Served* (the number of lines served by Electro-Mechanical switches), 160 *ASPC Lines Served* (the number of lines served by Analog Stored Program Controlled switches), and 180 *DSPC Lines Served* (the number of lines served by Digital Stored Program Controlled switches), rounded to the nearest thousand. Total Access lines in Service include all classifications of local telephone service including, but not limited to, individual lines, party line access, PBX access, Centrex access, Coin access, Foreign Exchange access and WATS access. FCC ARMIS Infrastructure Report 43-07, Report Definitions, Row Instructions, August 1993.

11. Data on Centrex extensions was taken from ARMIS Report 4308 (Operating Data) for the years 1991-1994. Data on Centrex lines for 1990 was not available, so we applied the average growth rate for the period 1991-1994 to the 1991 amount to derive an estimate of the 1990 value. An average trunk equivalency ratio of 8:1 was applied to the number of Centrex extensions to arrive at the PBX equivalent number of Centrex lines.

to loop plant capacity.[12] Centrex lines in excess of their PBX trunk equivalents are appropriately removed from the analysis because they represent competitive (non-basic) service lines that are used for intercommunication purposes that would not exist under the (basic service) PBX trunk alternative.

In estimating available capacity for the RBOCs, "DSPC Lines Served"[13] and "Total Equipped Channels"[14] were selected as the measures of digital CO switching and loop plant capacity, respectively. These estimates of digital CO and loop capacity taken from ARMIS, however, are not true measures of capacity, but rather reflect lines (or channels) ready to serve. Dark fiber and excess digital switch processor capacity,[15] for example, would not be included in such measures. Accordingly, in order to approximate a more accurate (and realistic) measure of capacity for digital CO plant and loop plant, we develop a separate capacity adjustment factor for each plant group to apply to the raw line and channel counts taken from ARMIS. A conservative adjustment for digital CO capacity was developed based upon the most recent actual reported capacity data provided by Pacific Bell to the California Public Utilities Commission.[16] A similarly conservative adjustment for outside plant was developed based upon information available from the latest FCC Fiber

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12. As described in ARMIS Report Definitions, Row 370 - *Total Working Channels* - are counted on a 4 kHz bandwidth (single voice channel) basis. Working channels originating from a remote switch are treated the same as if the channels originated in the host central office. "Total Working Channels" are equal to the sum of rows 380 *Total Copper* (the number of copper working channels), 390 *Fiber Digital CXR* (the number of fiber digital CXR [carrier] working channels, converted to voice frequency equivalents) and 410 *Other* (other working channels). Whereas the "Total Number of Access Lines in Service" measure includes only switched lines, the "Total Working Channel" counts include non-switched loop plant in addition to switched. FCC ARMIS Infrastructure Report 43-07, Report Definitions, Row Instructions, August 1993.

13. As described in ARMIS Report Definitions, Row 180 *DSPC Lines Served* is defined as the number of lines served by Digital Stored Program Controlled switches, rounded to the nearest thousand. *Id.*

14. As described in ARMIS Report Definitions, Row 420 - *Total Equipped Channels* - are counted on a 4 kHz bandwidth (single voice channel) basis. Equipped channels originating from a remote switch are treated the same as if the channels originated in the host central office. "Total Equipped Channels" are equal to the sum of rows 430 *Copper* (the number of copper equipped channels), 440 *Fiber Digital CXR* (the number of fiber digital CXR equipped channels) and 460 *Other* (other equipped channels). *Id.*

15. A digital CO switch central processor may have a capacity of up to 100,000 lines, but the machine may only be "equipped" for a far smaller number, for example, 40,000 lines. ARMIS capacity data will reflect only the smaller (i.e., most limiting) of these two capacities.

16. Pacific Bell Monitoring Report, P.E—01—00 for digital CO capacity. We applied a capacity adjustment factor of 7.5 percent, i.e., we grossed up DPSC Lines in Service data from ARMIS by 7.5%. Note that the Pacific Bell report is also based upon "most limiting capacity" and hence does not report excess capacity in other switch components, such as the central processor.

Deployment Update and from general industry knowledge.[17] Applying these adjustment factors yields a second set of digital CO growth and loop growth figures that are more appropriately analyzed in relationship to the corresponding growth in access lines and working channels.

The respective growth levels for each of these measures is calculated by subtracting the 1990 reported figures from the corresponding 1994 data. Once the growth levels are obtained, we develop plant addition utilization factors (i.e., the percentages of digital CO capacity and loop growth, respectively, that can be explained by growth in demand) by dividing access line growth by the growth in DSPC lines served (to derive the percentage of added digital CO capacity that is demand driven), and by dividing working channel growth by the growth in equipped channels (to derive the percentage of loop growth that is demand driven).

Application of utilization data to investment figures

The utilization percentages estimated in the preceding step are now applied to the actual 1990-1994 plant additions to derive the amount of plant additions that appear to have been driven by growth in basic service demand. Investment data is taken from ARMIS Form 43-02 reports for Account 2212 Digital Electronic Switch (for digital CO plant) and Account 2410 Cable & Wire (for loop plant). Estimates of demand-driven plant additions are calculated by multiplying the dollar amounts of the plant additions by the percentage of capacity that is driven by demand, as determined in the preceding step. Since revisions to plant additions will also impact the levels of retirement of plant, we also calculate revised retirement amounts that correspond to the revised new plant additions. The method employed maintains the same proportion of retirements to additions in any given year.

In a few instances, utilization percentages estimated for outside plant facilities were negative, indicating that additional outside plant facilities were deployed despite the fact that the RBOC experienced an overall decline (i.e., negative growth) in basic service demand over the period. In such cases, to be conservative and because some portion of the additions our methodology would treat as excess capacity may be necessary to support basic service demand even in an overall negative growth environment (e.g., plant replacements caused by normal wear and tear of plant used to serve basic demand, and/or the non-fungibility of plant due to geographic shifts in demand), we set a floor below which we do not reduce additions. Specifically, in no case do we reduce plant additions by more than

17. See, Kraushaar, Jonathan M., *Fiber Deployment Update: End of Year 1994*, Industry Analysis Division, Common Carrier Bureau, F.C.C., July 1995. For Loop growth, we used a capacity adjustment factor of 25%, i.e., we grossed up the Total Equipped Channel data available from ARMIS by 25%.

90%, i.e. we assume ILECs could justify a base level of additions of 10% of their actual levels as being required to support the existing base of basic service demand even under zero- or negative-growth conditions.

Calculation of revised net TPIS results for the post-1990 period

The revised additions and revisions data are then input into our vintage analysis model, which is then used to calculate revised net TPIS amounts for the 1990 to 1995 period. Based upon these revised net TPIS amounts, we can then estimate the amount by which TPIS for any given ILEC is overstated as a result of investments made for purposes other than the satisfaction of basic demand growth.

The utilization analysis worksheets are reproduced in Appendix C to this Study.

3 RESULTS OF THE EMPIRICAL ANALYSIS

Vintage Analysis

The vintage analysis determines the relative age of ILEC net book investment in order to test the validity of ILEC claims that large amounts of obsolete plant — acquired at a high cost relative to today's prices — remain in the ILECs' embedded rate base.

As shown in Table 1 on the following page, the results of the vintage analysis confirm that the majority of current ILEC net plant in service is relatively new, representing investments that were made by the ILECs during the post-1990 period. As of the end of 1995, in a pattern quite consistent across the RBOCs as well as SNET, 60% of the net TPIS can be attributed to plant vintages of 1990 or later. This finding specifically refutes the notion implicit in arguments advanced by the ILECs that a large embedded base of old and obsolete plant is responsible for creating a divergence from TSLRIC results.

As Table 1 demonstrates, the amount of net TPIS falling in the category of post-1990 vintage plant is substantial. As of the end of 1995, of total RBOC net TPIS of $119.5-billion, approximately $71.4-billion relates to plant deployed in 1990 or later, while only $48.1-billion relates to plant deployed prior to January 1, 1990. At the beginning of 1990, net TPIS for the RBOCs stood at $117.4-billion,[18] such that by the end of 1995, the amount of older (i.e., pre-January 1, 1990) net plant remaining on the RBOCs' books had fallen by some $69.3-billion — roughly equivalent to the amount RBOCs had added to net plant in the post-1990 period.

18. Derived in ETI Vintage Analysis (Appendix A), using FCC ARMIS (USOA) Report 43-02, Table B1.

Table 1

The majority of current ILEC net plant in service is relatively new.

Investment and Percentage of Net TPIS Attributed to Pre- and Post-January 1, 1990 Periods, as of the end of 1995

RBOCs	Net TPIS Year End 1995 ($000)	Net TPIS Attributed to Pre 1-1-90 Vintages ($000)	Percent	Net TPIS Attributed to Post 1-1-90 Vintages ($000)	Percent
Ameritech	$14,874,907	$6,694,965	45.0%	$8,179,942	55.0%
Bell Atlantic	$18,126,694	$7,503,364	41.4%	$10,623,330	58.6%
BellSouth	$22,990,452	$8,437,811	36.7%	$14,552,641	63.3%
Nynex	$16,800,636	$6,296,223	37.5%	$10,504,413	62.5%
Pacific Telesis	$14,629,943	$6,235,511	42.6%	$8,467,997	57.9%
SBC Communications	$15,116,818	$6,763,120	44.7%	$8,353,698	55.3%
US West	$16,935,629	$6,173,582	36.5%	$10,762,047	63.5%
TOTAL RBOC	$119,475,079	$48,104,576	40.3%	$71,444,068	59.8%
SNET	$2,146,681	$872,912	40.7%	$1,273,769	59.3%

Source: ETI Vintage Analysis, Appendix A: Data from ARMIS Report 43-02.

Moreover, as shown in Table 2 on the following page, the results of the vintage analysis further demonstrate that in the aggregate, newer vintage plant is replacing the older vintages at the steady pace of approximately 5%-10% per year. Thus, in the next several years, during the transition to a more competitive local exchange environment, the ILECs will have replaced or retired a substantial portion of their older vintage plant. Projecting out only a few more years, the percentage of pre-1990 plant is likely to fall in the range of only 25% to 30%. Further, as discussed below in the context of the composition analysis we performed, those categories of older vintage plant remaining on the companies' books consist disproportionately of plant that is neither economically nor technologically obsolete. While the specific percentages vary, the results across companies are quite similar.

Table 2

Over the next few years, the ILECs will have replaced most of their embedded base consisting of older vintage plant.

Yearly Change in Percentage of TPIS Attributed to Pre- and Post-January 1, 1990*

	Ameritech	Bell Atlantic	BellSouth	NYNEX	Pacific	SBC	US West	SNET
Year End	Pre/Post	Pre/Post	Pre/Post	Pre/Post	Pre/Post	Pre/Post	Pre/Post	Pre/Post
1989	100%/0%	100%/0%	100%/0%	100%/0%	100%/0%	100%/0%	100%/0%	100%/0%
1990	88.6%/11.4%	86.7%/13.3%	86.8%/13.2%	87.1%/12.9%	88.9%/11.1%	92.0%/8.0%	88.3%/11.7%	84.5%/15.5%
1991	77.8%/22.2%	75.6%/24.4%	75.0%/25.0%	76.5%/23.5%	78.4%/21.6%	83.6%/16.4%	76.2%/23.8%	73.5%/26.5%
1992	68.6%/31.4%	66.6%/33.4%	65.3%/34.7%	65.9%/34.1%	69.0%/31.0%	74.4%/25.6%	64.5%/35.5%	63.7%/36.3%
1993	59.9%/40.1%	58.0%/42.0%	55.2%/44.8%	56.1%/43.9%	60.0%/40.5%	65.9%/34.1%	54.8%/45.2%	55.7%/44.3%
1994	52.5%/47.5%	49.9%/50.1%	45.7%/54.3%	46.4%/53.6%	51.5%/49.0%	57.7%/42.3%	45.5%/54.5%	48.2%/51.8%
1995	45.0%/55.0%	41.4%/58.6%	36.7%/63.3%	37.5%/62.5%	42.6%/57.9%	49.6%/50.4%	36.5%/63.5%	40.7%/59.3%
1996 est.	39.4%/60.6%	35.7%/64.3%	31.1%/68.9%	31.9%/68.1%	37.0%/63.5%	44.1%/55.9%	30.9%/69.1%	35.0%/65.0%
1997 est.	34.5%/65.5%	30.9%/69.1%	26.3%/73.7%	27.1%/72.9%	32.1%/68.4%	39.3%/60.7%	26.1%/73.9%	30.2%/69.8%

* Net TPIS values for Pacific Telesis in years 1993-1997 slightly exceed 100% due to data discrepancy in ARMIS.
Source: ETI Vintage Analysis, Appendix A.

The vintage analysis thus provides clear empirical evidence that, contrary to ILEC claims and other "conventional wisdom," the existence of a "gap" between historical embedded costs and LRIC results *cannot* be ascribed to the obsolescence of plant put in place to satisfy growth in basic service demand. Rather what we see is that the majority of plant carried on the ILECs books was deployed during the 1990s — a time period in which fundamental regulatory changes, competitive inroads, and corresponding strategic responses, were clearly being contemplated and addressed by the ILECs.

Composition Analysis

From the composition analysis, which examines data at the plant account level, we glean important information concerning the composition of the ILEC installed base as between older and newer vintage plant. Specifically, we look for patterns with respect to the relative economic value of older versus newer vintage plant, and in particular, for the types of older plant surviving on the ILECs' books, whether similar plant is being acquired today, and if so, how current reproduction costs (such as reflected in TSLRIC results) compare to original historic acquisition costs.

Table 3

A much greater proportion of older vintage plant is surviving for plant categories for which current costs may be higher than historical embedded costs.

Range across RBOCs of Percentage of Plant Surviving (as of the end of 1995) for Largest State Operating Area

	Pre 1-1-90	Post 1-1-90
Cable-Metallic	64.5%-80.5%	19.5%-35.5%
Buildings	69.2%-84.4%	15.6%-30.8%
Conduit	69.8%-83.2%	16.8%-30.2%
Poles	70.1%-83.5%	16.5%-29.9%
Total RBOC Net TPIS from Table 1	40.3%	59.8%

Sources: Generation Arrangements of Ameritech–IL, Bell Atlantic–PA, BellSouth–FL, NYNEX–NY, Pacific Bell–CA, Southwestern Bell–TX, and US West–CO.

The results of the composition analysis confirm that for plant accounts such as metallic (i.e. copper) cable, building, conduit, and poles, for which, as discussed further below, current reproduction costs may be higher than historical embedded costs, there is a markedly greater proportion (in most cases, roughly double) of older vintage plant surviving as compared with the aggregate vintage results.

As shown in Table 3, the percent of pre-1990 plant surviving for metallic cable and building plant accounts ranges from 60% up to 80%. Similarly, for poles and conduit, a relatively large proportion of plant surviving, in the range of 70% to 80%, is associated with older vintage plant. For RBOC net TPIS overall, the comparable proportion of older

vintage plant surviving is only 40% (as found in ETI's vintage analysis).

As shown in Table 4, the four types of plant highlighted in Table 3 represent roughly half of total RBOC net TPIS as of the end of 1995. However, because they consist disproportionately of older vintage plant, these plant categories will dominate the pre-1990 investment derived in the vintage analysis and shown in Table 1.

Table 4

Four types of plant for which current costs may exceed historical embedded costs are a significant component of net TPIS.

Net Investment of Plant in Service
(as of the end of 1995)

Cable-Metallic	$34,566,728
Buildings	$13,295,385
Conduit Systems	$9,675,255
Poles	$1,464,195
Subtotal	$59,001,563
Total RBOC Net TPIS	$119,475,079

Sources: F.C.C. ARMIS Report 43-02; ETI Composition Analysis, Appendix B.

Thus, while the results of the vintage analysis demonstrate that the majority of the plant carried on the books of the ILECs is not in fact old, the composition analysis tells us that the types of plant comprising the older plant vintages have relatively high value to the ILECS, either because to acquire such plant may cost more today as compared with the time they were added, or because of their revenue-generating potential (as is the case with excess building space). It is well established that for certain technology-impacted ILEC capital inputs, such as digital switching systems and fiber optic cable, prices have been declining over time. However, for other inputs, such as copper cable, buildings, poles, and conduit, this is not the case. Current prices for these accounts generally exceed historic costs due to increases in both labor and material inputs.[19]

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19. In the Commission's Price Cap Review proceeding, CC Docket 94-1, several parties including USTA, AT&T, and Ad Hoc Telecommunications Users Committee, relied upon various price indices to deflate capital asset categories of ILEC investment from annual current dollar expenditures into constant dollars. USTA originally relied upon Telephone Plant Indices (TPIs) developed by the ILECs, but subsequently switched to the asset price deflators developed by the Bureau of Economic Analysis (BEA) and Bureau of Labor Statistics (BLS) in response to Commission concerns regarding the proprietary nature of ILEC TPI data. The BEA/BLS indices were also relied upon in the AT&T and Ad Hoc analyses presented in Docket 94-1. Both the TPI and BEA/BLS data reveal that, relative to the prices paid by the ILECs for other kinds of telecommunications plant, the prices paid for plant in the categories encompassing metallic cable, buildings, poles, and conduit, increased significantly over the period 1984 to 1994. By contrast, the prices paid by the ILECs for plant in the categories encompassing general support, central office, transmission, and information origination/termination, either decreased or exhibited a slower rate of increase depending on the price index used. Moreover, both the TPI and BEA/BLS data grossly overstate the rate of price growth for these latter categories of plant because of their failure to adjust for changes in quality and/or capacity (so-called "hedonic" adjustments). Hedonic adjustments are particularly relevant for the high-technology capital inputs such as digital switching, digital electronics, and fiber optic transmission plant, whose characteristics have

(continued...)

Taken together, the vintage and composition results strongly suggest that in the next several years, during the transition to a more competitive local exchange environment, the ILECs will have replaced or retired virtually all categories of their pre-1990 embedded base of plant that has become economically and/or technologically obsolete.

Utilization Analysis

The two preceding analyses focused upon the vintage, or relative age, of ILEC embedded investment, at the aggregate and plant-account levels respectively, distinguishing between investment incurred in the pre- and post-1990 periods. In the utilization analysis, we further examine the post-1990 investment for the purpose of determining the portion of that aggregate investment that can be attributed to supporting growth in demand for basic service.

As shown in Table 5, our utilization analysis demonstrates that, on balance, growth in demand for basic service is likely to explain only a relatively small fraction of ILEC central office and outside plant investment over the 1990-1995 period. As Table 5 indicates, there is a relatively consistent pattern across all RBOCs, with only in the range of 12% to 37% of digital central office capacity added over the period

Table 5

Demand growth for basic service explains a relatively small fraction of recent ILEC central office and outside plant investment.

Percentage of Digital CO and Loop Capacity Additions Explained by Basic Service Demand Growth, 1990-1995

	Digital CO	Loop
Ameritech	12.3%	-15.8%
Bell Atlantic	18.7%	9.0%
BellSouth	33.8%	71.2%
NYNEX	15.3%	4.9%
Pacific Telesis	22.3%	33.2%
Southwestern Bell	34.8%	82.2%
US West	37.1%	66.0%
TOTAL RBOC	**23.7%**	**24.6%**

Sources: F.C.C. ARMIS Reports 43-07 and 43-08, 1990-1994; ETI Utilization Analysis, Appendix B.

19. (...continued)
evolved rapidly over time and reflect substantial technology-driven capacity and capability improvements. Hedonic adjustments do not apply to plant categories such as metallic cable, buildings, pole, and conduit, for which the nature of the input has been relatively stable. See Lee L. Selwyn, and Patricia D. Kravtin, *Establishing the X-Factor for the FCC Long-Term LEC Price Cap Plan*, CC Docket 94-1, prepared for the Ad Hoc Telecommunications Users Committee, December 1995, pp. 36-42; also Appendix B, Comparison of TPIs used in the Christensen Study with BEA/BLS Asset Deflators.

January 1, 1990 through the end of 1995, that may be explained by growth in the demand for basic services.

There is a much broader range of results across RBOCs with respect to their utilization of gross added outside plant capacity. As shown in Table 5, utilization results range from as low as *negative* 16% (for Ameritech) to as high as 82% (for SBC Communications). Bell Atlantic and NYNEX utilized only about 5% to 10% of their added outside plant, while BellSouth and US West exhibit high utilization rates in the vicinity of 70%. Finally, Pacific Telesis used about 34% of the outside plant it added since January, 1990.

Several interesting observations can be made concerning these seemingly disparate results for utilization of the recently-acquired outside plant. First, for Ameritech, the negative utilization result indicates that this particular RBOC deployed additional outside plant facilities despite experiencing an overall decline (i.e., negative growth) in basic service demand over the period. While the ARMIS data for Ameritech show a relatively small, but positive, increase over the study period in the number of total working channels (the data used in the utilization analysis to measure basic service demand), this increase includes growth in *non-basic* Centrex lines. As discussed in Section 2 of this Study, the growth in non-basic Centrex lines is not appropriately treated as basic service demand growth, and must be excluded from the total working channel counts provided in ARMIS. Correspondingly, any increased outside plant additions motivated by the RBOCs' desire to compete in the PBX/Centrex market is appropriately recovered from Centrex services and not in the rates charged competitors for interconnection and unbundled network elements.

Second, companies exhibiting the lowest outside plant utilization, namely, Ameritech, NYNEX, and Bell Atlantic, operate in areas where regulatory and market conditions have historically been relatively conducive to competition. This is not generally the case for companies at the "high end" of outside plant utilization results. For example, SBC, the company exhibiting the highest outside plant utilization, is generally perceived to be operating in states that have, up to now, been more amenable to protecting ILEC markets and revenues from competition than have regulators in many other jurisdictions.[20] Moreover, SBC is known to be an aggressive investor in cellular and other out-of-region acquisitions. Accordingly, SBC's motivation for constructing excess outside plant capacity as part of a competitive response strategy may be less intense than for other, more competitively-impacted RBOCs. Similarly, the other two RBOCs experiencing relatively high utilization of their recently-acquired outside plant, BellSouth and US West, are also generally perceived to be operating in regions where regulatory and/or market conditions

20. See Lesley Cauley, Steven Lipin, "Pacific Telesis, SBC Are Holding Talks For What Would Be First Merger of Bells," The Wall Street Journal, April 1, 1996, at A3-A4; also Albert R. Karr, "Texas defies Washington in Phone Deregulation, Protecting Its Local Bell Against Giant Rivals," The Wall Street Journal, May 2, 1996, at A16.

Table 6

A substantial amount of net investment cannot be explained by basic service demand growth.

($000 as of the end of 1995)

RBOCs	Actual Net TPIS Year End 1995	ETI Revised Net TPIS Year End 1995	Excess Net TPIS
Ameritech	$14,874,907	$10,514,608	$4,360,299
Bell Atlantic	$18,126,694	$13,522,224	$4,604,470
BellSouth	$22,990,452	$20,046,537	$2,943,915
Nynex	$16,800,636	$11,018,323	$5,782,313
Pacific Telesis	$14,629,943	$11,364,364	$3,265,579
Southwestern Bell	$15,116,818	$13,679,177	$1,437,641
US West	$16,935,629	$14,037,081	$2,898,548
Total RBOC	$119,475,079	$94,182,314	$25,292,765

Sources: F.C.C. ARMIS Report 43-02; ETI Utilization Analysis Results, Appendix C.

have (at least in the past) been less conducive to local competition. Moreover, US West, like SBC, has been aggressive in its pursuit of non-telephony business operations. In particular, US West has made relatively large financial commitments to out-of-region cable operations.

Third, even for these companies at the "high" end of the "demand-driven" outside plant utilization (i.e., estimates in the range of 66% to 82%) together with digital CO plant utilization estimates (averaging 24% for the RBOCs), suggest a substantial amount of historic investment that cannot be explained by basic service demand growth. On the basis of the utilization estimates shown in Table 5, we estimate for each of the RBOCs (and for the RBOCs overall) net TPIS (as of the end of 1995) that cannot be explained by growth in basic service demand. These results are presented in Table 6. For example, for BellSouth, an estimated loop plant utilization factor of 71% in conjunction with an estimated digital CO plant utilization factor of 34%, results in an estimated $2.9-billion in excess net plant relative to that required to satisfy growth in basic service demand over the 1990 to 1995 period.

As shown in Table 6, for RBOCs nationwide, we estimate in the order of magnitude of as much as $25-billion of net TPIS (as of the end of 1995) that cannot be explained by

basic service demand growth. The results of this analysis suggest that a substantial amount of ILEC net plant placed in service during this period appears to have been motivated by other strategic goals and purposes.

We have considered other possible explanations of a portion of the excess investment identified in our utilization analysis. Specifically, the replacement of older plant, e.g., analog switching, with newer vintage plant (e.g., digital technology) could be economically justified for reasons other than meeting demand growth, either because of (1) operational cost savings that accompany the replacement, and/or (2) increased revenues associated with the offering of new services made possible by the replacement. With respect to the first potential explanation, we examined maintenance data for analog and digital switching plant over the period 1990 to 1995, but we find no evidence to date of operational cost savings in the form of reduced maintenance expense per unit. It is possible that it simply may be too soon for operational cost savings to manifest themselves, and that in the future as the changeover to digital plant is completed, such results could be observed. The emergence of such *future potential* operational cost savings, however, is simply not relevant for purposes of this analysis, since those future gains will flow to the RBOCs. Similarly, to the extent that the justification of plant deployment is attributed to the generation of new service revenues, the cost of that plant is properly attributable to the new services that motivated the deployment in the first place, and must not be recovered through rates charged to competitors for interconnection and unbundled network elements.

4 OTHER EXPLANATIONS AND SOURCES OF THE "GAP"

In addition to the quantitative evidence that we have presented here, there is strong anecdotal evidence of ILEC behavior that corroborates and underscores our analytical findings. In this Study, we address LEC strategic positioning (1) in the market for Centrex-type services with advanced features, (2) in the market for additional residential lines and other discretionary services, and (3) in the market for advanced and broadband digital services.

ILEC pursuit of the market for advanced Centrex-type services may have motivated the unnecessarily early replacement of analog central office switches and the excessive deployment of subscriber outside plant.

Centrex is an ILEC service offering that competes directly with customer premises PBX telephone systems that are offered by independent telecommunications equipment vendors. With Centrex, the switching functions are supported by a Class 5 central office switch located on the telephone company premises. As such, each individual Centrex station line requires a dedicated subscriber loop between the customer's premises and the CO for both interconnection and public network traffic. With a PBX, where the switching functions take place at the *customer's* site, the CO is involved only in public network traffic, which can be easily concentrated on a far smaller number of PBX trunks. Typically, a Centrex may require anywhere from 8 to 15 times as many loops as a comparably-sized PBX configuration.

To be competitive in this market, Centrex must provide advanced digital features comparable to those that are customarily offered in modern digital PBX switches and must be available for delivery/installation in approximately the same time frame as PBX vendors routinely offer to their customers. Participation in the Centrex/PBX (or more generally the "business telephone systems") market thus requires:

- that ILECs deploy advanced digital central office switches in sufficient quantity and with sufficient geographic diversity to respond to diverse customer demand in a timely manner; and

- that ILECs deploy and maintain sufficient excess outside plant capacity to accommodate in a timely manner the potential demand for the additional central office loops that are required to serve a Centrex customer over those that would be required where the customer subscribes for PBX trunks only.

The same digital central office switch that is required to support advanced Centrex features may also be used to provide "Plain Old Telephone Service" ("POTS") to core basic services customers. Thus, while an ILEC may be motivated to replace an older analog electronic central office switch with a digital machine primarily so that it can compete with digital PBX suppliers in the business telephone systems market, it can easily shift POTS customers from older machines to the new switch and thereby rationalize the investment for (and assign the majority of its costs to) POTS.

Also, in order for ILECs to be competitive in the Centrex/PBX market, they must have in place sufficient outside plant to support Centrex-level demand in whatever locations it may arise. Not surprisingly, ILEC outside plant construction guidelines typically require such intensity in commercial office buildings and similar locations. In other words, if the size of a building is capable of housing, for example, 5,000 employees, the ILEC will typically deploy 5,000 pairs of loop plant (plus additional spare capacity) to serve that building *whether or not the customer(s) in that building actually order Centrex.* Evidence submitted in CC Docket No. 96-98 by GTE indicates that Centrex has maintained a consistent market share (of the combined Centrex/PBX market) in the range of about 23% since 1992, with no diminution projected through 1997.[21] Thus, on average, in excess of four loops (plus even more for spare) will have been constructed and deployed for every *one* Centrex line that is actually placed in service. This conclusion is, of course, fully consistent with our own findings that a significant percentage of outside plant capacity additions made since January 1, 1990 was not required to support POTS growth.

The opportunity and potential for this type of misallocation portends to be substantially greater as ILECs initiate programs aimed at deploying broadband distribution infrastructures providing "fiber to the home" or "fiber in the loop" capacities, and pursue large-scale interactive information services ventures requiring greatly expanded network "intelligence." Here, the motivation behind such potentially massive investment programs is clearly entry into "new" broadband service markets and adjacent interactive information services and video entertainment fields. Yet if these broadband and intelligent network facilities are also *utilized* (whether or not actually *required*) to support conventional voice telephone services, an ILEC may be able to improperly assign a large share of the costs of its broadband plant

21. Doane, Michael J., J. Gregory Sidak and Daniel F. Spulber, *An Empirical Analysis of Pricing under Section 251 and 252 of the Telecommunications Act of 1996*, Attachment 4 to Comments of GTE Corporation, CC Docket No. 96-98, May 16, 1996, at II-16.

to, and recover those costs from, prices for its core local exchange telephone services and unbundled network elements.

This would not by any means be the first time that ILECs have constructed outside plant distribution networks with strategic, competitive goals in mind. In 1983, the California PUC found that Pacific Bell's plant utilization was inappropriately low, and imposed an explicit "underutilization penalty" on the Company that would remain in effect until the problem was corrected.[22] This phenomenon of underutilization also occurred throughout the Bell system. In the mid-1970s, the average loop plant utilization for the Bell System companies was reported to be in the range of 70%.[23] However, by the mid-1980s, subscriber outside plant (OSP) occupancy for the BOCs had noticeably declined. For example, the loop plant utilization reported by Pacific Northwest Bell - Washington (now US West Communications, Inc.) declined from 69.9% in 1975 to only 60.8% in 1988.[24] Several years later, in a study undertaken by Economics and Technology, Inc. for the Washington Utilities and Transportation Commission,[25] ETI found that the low plant utilization rates present in Washington State could be explained by the precipitous drop in the demand for Centrex service that began shortly after 1980.

ETI noted that OSP utilization levels would have remained essentially constant had the demand for Centrex (relative to PBX trunks) remained at pre-1980 levels. Unlike PBX systems that require a relatively small complement of loop pairs (PBX trunks) to serve a much larger number of individual PBX station lines (for a station:trunk ratio that is typically in the range of 8:1 to 12:1, depending upon overall system size and traffic patterns), Centrex service requires one loop pair for *each* station line since the switching function takes place at the telephone company central office. ETI speculated that Pacific Northwest Bell - Washington (PNB-WA, now US West Communications, Inc.) had continued to construct subscriber outside plant assuming that the same loop demand density would persist. Thus, PNB-WA continued to deploy plant to serve new commercial development *on the basis that at some point a customer at that business location would want to order Centrex.* This policy, of course, resulted in large quantities of unused ("spare") outside plant, whose costs would have to be spread to other services.[26]

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22. California Public Utilities Commission, D.83-12-025, 13 CPUC 2d, at 479.

23. *See* Lee L. Selwyn, Patricia D. Kravtin, and Paul S. Keller, *An Analysis of Outside Plant Provisioning and Utilization Practices of US West Communications in the State of Washington*, prepared for the Washington Utilities and Transportation Board, March, 1990, Attachment 8.

24. *Id.*

25. *Id.* at 9.

26. *Id.* at 22.

Thus, the excess loop capacity over and above basic demand growth attributable to Centrex, as described in the examples above, will create embedded costs that will not be accounted for in TSLRIC studies. ETI believes a significant portion of the "gap" may be explained by the amount of excess outside plant put in place for Centrex.

ILEC efforts to expand the market for additional residential lines and other discretionary services required the ILECs to design and construct far more extensive feeder and distribution infrastructures (and expend far greater aggregate capital investments) than otherwise would have been required to provision basic local exchange service.

Centrex is by no means the only loop-using service that imposes disproportionately high outside plant excess capacity requirements on ILEC plant. In fact, the outside plant capacity that would have been needed to support a "one line per household" feeder/distribution network is substantially smaller than that required when the ILEC offers to supply *additional* residential access lines on demand.

Consider the following example. Suppose that on a given street there are a total of 80 dwelling units, and that there is one and only one residential access line connected to each of these units. The street is fully developed and there is no possibility that anyone will create any additional dwelling units. If the only service that the ILEC is to provide consists of these 80 residential access lines, then the size of the distribution cable for this street would be the next highest capacity above the 80 working lines plus approximately 5% (i.e., 4 pair) for maintenance spare. If the next largest cable is 100 pair, then that would be more than sufficient, and overall utilization of the distribution plant (defined as the ratio of working lines to total lines) would be 80%. If the plant were only used to support first line demand, the fill at relief should be even greater. Accounting only for breakage and maintenance spare, the objective fill for a one-loop per dwelling unit distribution network would be 95%. Obviously, the requirements would have differed if the ILEC had not been interested in expanding the market for additional line and other discretionary services.

Using the above example, suppose that on average 20% of residential customers order a second line; the LEC assumes that it cannot know, *a priori*, precisely which ones of the 80 primary-line customers will request an additional line, or how many such lines any given customer will order.[27] The LEC decides that, in configuring its distribution plant, it will provide an average of *two pairs* per dwelling unit to accommodate the core demand for the

27. In fact, the LEC can use market and demographic data to more accurately target capacity deployment to likely additional line demand, thereby reducing by a considerable amount that actual number of spare pairs that will be needed to support additional lines in any given distribution route.

primary access line as well as the discretionary demand for additional lines.[28] On this basis, it will require a minimum of 160 pairs (80 x 2) plus 8 (5% of 160) for maintenance/ administrative spare, or 168 in all. The next largest cable size is 200 pair, so that is what will be deployed. However, since the average demand for additional lines is 20%, only 96 out of the 200 available pairs will be in service (i.e., 80 first lines plus 16 additional lines), creating an overall utilization rate of 48% (96/200). Put another way, the inclusion of capacity capable of supporting additional residential access lines caused the overall size of the cable to increase and resulted in a drop in utilization from 80% to 48% overall.

The nature of the demand for primary and additional lines thus affects the outside plant capacity that is required to support the needs of each of these services. Only about 12.3% of residential telecommunications customers take additional access lines,[29] and there is a strong relationship between household income and the demand for this service.[30] The demand for additional lines is thus highly variable both with respect to the aggregate number of units as well as the specific locations where service will be requested. In order to accommodate this highly volatile and uncertain demand, ILECs have deployed far more capacity than would have been required to meet existing basic service demand.

From the foregoing discussion, it is apparent that the aggregate quantity of distribution plant would have been less, and its costs would have been lower, if it had been designed solely to support current levels of basic service demand. There is no argument, however, that the distribution infrastructure should be built to accommodate more than this core level of demand, because there is demand for additional services and because, due to the presence of economies of scale and scope in the provision of primary and additional residential access lines, the incremental costs of providing additional units of capacity *at the time of initial construction* are less than the cost per unit of additional line capacity that would be required were the feeder and distribution plant designed solely for the baseline basic service demand. In identifying that portion of outside plant additions needed to serve demand for basic network elements, it is necessary to identify and to exclude those costs associated with excessive amounts of embedded outside plant, motivated by an ILEC's competitive and strategic interests.

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28. Pacific Bell has indicated that this is the standard practice that it applies for buried distribution cable. Calif. PUC I.95-01-021, Deposition of W. Vowel, March 11, 1996, at 120-123. The Pacific Bell Cost Proxy Model (CPM) assumes distribution plant is engineered at a ratio of 2 lines per household for buried plant and 1.5 lines per household for aerial plant. Pacific Bell CPM Documentation at 9.

29. *Percentage Additional Residential Lines for Households with Telephone Service*, FCC Industry Analysis Division, March 11, 1996.

30. See, Deposition of William L. Vowel, CPUC I.95-01-021, May 11, 1996, at Tr. 143-44.

ILEC strategic positioning in the market for other advanced and broadband digital services has resulted in the ILECs significantly increasing feeder facilities relative to those actually required to efficiently meet demand for basic services.

One explanation for the observed expansion of outside plant investment, as mentioned earlier, has been the growing interest among ILECs to acquire a broadband- and video-capable infrastructure. Historically, an ILEC's local exchange network was designed to supply primarily POTS-type services. Over time, an ILEC would have deployed an extensive embedded base of copper feeder and distribution plant that was presumably optimized for that purpose. Evidence adduced in the California PUC's Universal Service proceeding[31] indicates that, over the past seven years, Pacific Bell has made a number of significant revisions to its Company-wide guidelines governing the planning and provisioning of feeder facilities to support its efforts to provide advanced digital and broadband services. The use of these revised guidelines by Pacific's loop facilities planners has led to a significant overbuilding of feeder facilities relative to those actually required to efficiently meet demand for POTS services.

At the same time, however, the Company's local exchange network has become far less efficient and more costly than would have been expected for a forward-looking full service network integrating POTS and advanced digital services (as reflected in utilization factors for feeder plant), since the Company's loop planning guidelines and actual practices were constrained by its embedded copper network. Consequently, *Pacific's embedded local exchange network is not representative of a least-cost network for either POTS services alone, or for POTS with a broad range of other services on the network.*

Further evidence of ILECs' past investment practices is revealed in their depreciation studies, which aim at obtaining economic lives and depreciation rates for plant accounts, directly influenced by the accelerated pace of plant acquisitions and replacements. ILECs have argued that increased depreciation rates were necessary to support the replacement of older equipment (that had become technologically obsolete) with new, modern plant. However, much of that investment seems to be focused on services other than basic telephone service, such as advanced and broadband digital services. Current trends demonstrate that ILECs' strategic positioning in the market for advanced and broadband

31. California PUC, R.95-01-020/I.95-01-021, *Rulemaking and Investigation on the Commission's Own Motion into Universal Service and to Comply with the Mandates of Assembly Bill 3643.*

digital services has required the ILECs to significantly increase feeder facilities relative to those actually required to efficiently meet demand for POTS services.[32]

In fact, Pacific Bell's triennial Depreciation Studies submitted in 1985, 1988, and 1991 indicated the Company's intention to use the higher annual charges to support extensive modernization of its network. Each of the Depreciation Studies submitted by the Company in the time period spanning 1985 through 1991 includes numerous assertions that Pacific Bell must increase its depreciation rates in order to respond to technological advances and competitive pressures. Pacific also expressed a direct linkage between accelerated plant replacement and the introduction of new services.

Pacific Bell's 1985 depreciation filing, which also resulted in increases in Pacific Bell's depreciation rates, posits specific relationships between the rate increases and the rate of plant replacement. As is the case with the 1988 and 1991 filings, Pacific Bell attempted to justify its 1985 filing based on the prospect of "accelerated advances in technology."[33] The company argued that, *as a provider of a full range of telecommunications services*, it needed to invest in new technologies.[34]

The LECs should not be allowed to pass on such costs through additional charges for unbundled network elements required by potential interconnecting competitive service providers.

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32. This analysis confirms the results of a previous report produced by ETI, which concluded that many of the RBOCs were in fact disinvesting in plant in service. The report argued that the RBOCs were not adequately investing in basic service infrastructure. Lee L. Selwyn, Sonia N. Jorge, and Irena V. Tunkel, *Patterns of Investment by the Regional Bell Holding Companies: An Examination of the Sources of Financing and the Relative Performance of the Bell Operating Company and the non-BOC RBHC businesses*, ETI Research Report, January 1996. Our current analysis takes a further step and demonstrates that of those investments taking place, many are not for basic telephone service, but rather are for a network capable of providing a vast array of new telecommunications services.

33. Pacific Bell 1985 Depreciation Rate Study, October, 1984, Section I, p. 33.

34. *Id.* at 34.

5 | CONCLUSION

This Study demonstrates that, contrary to the ILECs' efforts to portray their installed base of plant as consisting of technologically and economically obsolete equipment and facilities, the majority of the net rate base on ILEC books as of the end of 1995 was acquired on or after January 1, 1990. Moreover, our study demonstrates that a substantial portion of those post-1990 ILEC plant additions and retirements were attributed to the ILECs' pursuit of other strategic business goals and positioning for entry into new lines of competitive and often nonregulated businesses.

ETI's findings are consistent with several other recent studies of ILEC behavior and operations. For example, a recent study on depreciation policy by Baseman and Giesen demonstrated that the RBOCs' claims of a large depreciation problem appears to be motivated largely by their desire to enter non-telephony services.[35] In addition, the study found that the existing plant need not be replaced for efficient provision of basic local telephone service and that the RBOCs' proposals for accelerated depreciation would require users of basic telephone services to subsidize new services that many customers may not want.[36] Baseman and Giesen further demonstrated that the depreciation reserve deficiency, often argued by ILECs as a major burden on their ability to effectively compete, is in fact minimal and has decreased due to changes in FCC depreciation practices.

Another study, one conducted by Hatfield Associates, also reached conclusions similar to those of this analysis.[37] The Hatfield study found that the "gap" between the 'bottoms-up' economic costs and the 'tops-down' revenue requirement consists of a number of elements, including expenses associated with providing services to end-users, a small

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35. Baseman, Kenneth C. and Harold Van Gieson. "Depreciation Policy in the Telecommunications Industry: Implications for Cost Recovery by the Local Exchange Carriers," MiCRA, prepared on behalf of MCI Telecommunications Corp., December 1995, at 3.

36. *Id.*

37. Hatfield Associates, Inc., "The Cost of Basic Network Elements: Theory, Modelling and Policy Implications," prepared for MCI Telecommunications Corporation, March 29, 1996.

amount of economic overhead, and large amounts of overbuilt plant and excess overhead."[38] Specifically, the study identified five distinct revenue requirement components of the "gap": overbuilt plant, customer operations, corporate operations, inefficiencies, and underdepreciation. Consistent with our analysis, the Hatfield study concluded that overcapacity was the largest component of the "gap". Indeed, the study identified that excess ILEC plant capacity was due to investments in broadband services, interLATA official service networks, and loops.

Our findings in this study are robust and consistent with these other studies made using different methodologies. With this evidence, it is critical that the Commission make clear that the costs that are relevant in the determination of the Total Service Long Run Incremental Costs for unbundled network functions must exclude all historic and strategic components that are not relevant in the determination of forward-looking incremental costs. Costs associated with premature retirement of the installed base, with the acquisition of high-function assets for use in developing new strategic lines of business, and with corporate activities that are unrelated to the provision of essential basic network elements must not be imposed upon new local exchange service providers through the pricing of these elements. Similarly, ILEC strategic investments in facilities specifically designed to provide other services such as advanced broadband, or excess facilities targeted at future demand, must also be excluded. While the ILECs are free to make such strategic investments or to acquire capacities and capabilities that will support their long term business goals, these costs are not relevant to and should not be considered when determining interconnection or unbundled network elements rates.

38. *Id.* at 35.

Appendix A | VINTAGE ANALYSIS WORKSHEETS

Table A1	Ameritech
Table A2	Bell Atlantic
Table A3	BellSouth
Table A4	NYNEX
Table A5	Pacific Telesis
Table A6	SBC Communications
Table A7	US West
Table A8	SNET
Table A9	Development of Survivorship Curve

APPENDIX A WILL BE PROVIDED UPON REQUEST

Appendix B | COMPOSITION ANALYSIS WORKSHEETS

Table B1	Ameritech
Table B2	Bell Atlantic
Table B3	BellSouth
Table B4	NYNEX
Table B5	Pacific Telesis
Table B6	SBC Communications
Table B7	US West

APPENDIX B WILL BE PROVIDED UPON REQUEST

Appendix C | UTILIZATION ANALYSIS WORKSHEETS

Table C1	Ameritech
Table C2	Bell Atlantic
Table C3	BellSouth
Table C4	NYNEX
Table C5	Pacific Telesis
Table C6	SBC Communications
Table C7	US West

APPENDIX C WILL BE PROVIDED UPON REQUEST

BEFORE THE ARIZONA CORPORATION COMMISSION

IN THE MATTER OF THE PETITIONS OF:	)	
	)	
AMERICAN COMMUNICATIONS SERVICES,	)	DOCKET NO. U-3021-96-448
INC. AND AMERICAN COMMUNICATIONS	)	DOCKET NO. U-3245-96-448
SERVICES OF PIMA COUNTY, INC.;	)	DOCKET NO. E-1051-96-448
	)	
AT&T COMMUNICATIONS OF THE	)	DOCKET NO. U-2428-96-417
MOUNTAIN STATES, INC.;	)	DOCKET NO. E-1051-96-417
	)	
MFS COMMUNICATIONS COMPANY, INC.;	)	DOCKET NO. U-2572-96-362
	)	DOCKET NO. E-1051-96-362
	)	
TCG PHOENIX;	)	DOCKET NO. U-3016-96-402
	)	DOCKET NO. E-1051-96-402
	)	
MCIMETRO ACCESS TRANSMISSION	)	DOCKET NO. U-3175-96-479
SERVICES, INC.;	)	DOCKET NO. E-1051-96-479
	)	
BROOKS FIBER COMMUNICATIONS OF	)	DOCKET NO. U-3009-96-478
TUCSON, INC.;	)	DOCKET NO. E-1051-96-478
	)	
SPRINT COMMUNICATIONS COMPANY, L.P.;	)	DOCKET NO. U-2432-96-505
and	)	DOCKET NO. E-1051-96-505
	)	
GST TUCSON LIGHTWAVE, INC.	)	DOCKET NO. U-3155-96-527
	)	DOCKET NO. E-1051-96-527
	)	
FOR ARBITRATION OF THE RATES, TERMS, AND CONDITIONS OF INTERCONNECTION WITH U S WEST COMMUNICATIONS, INC. PURSUANT TO § 252(b) OF THE TELECOMMUNICATIONS ACT OF 1996.	)	(Consolidated)

REBUTTAL TESTIMONY
OF
THOMAS M. ZEPP
on behalf of

AT&T COMMUNICATIONS OF THE MOUNTAIN STATES, INC.

November 8, 1996

I. BACKGROUND

Q. PLEASE STATE YOUR NAME AND ADDRESS.

A. My name is Thomas M. Zepp. My business address is Suite 250, 1500 Liberty Street, S.E., Salem, Oregon 97302.

Q. DID YOU PREPARE DIRECT TESTIMONY IN THIS CASE?

A. Yes. I filed direct testimony on October 25, 1996.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF THIS SUPPLEMENTAL TESTIMONY?

A. I respond to Dr. Harris' November 1, 1996, testimony on the relevance of actual construction expenditures for loops and the embedded costs of loops as tests of the reasonableness of U S WEST's estimates of Total Service Long Run Incremental Cost ("TSLRIC") or Total Element Long Run Incremental Cost ("TELRIC") of loops required to provide Plain Old Telephone Service ("POTS"). As part of my response to Dr. Harris, I provide a table comparable to my Exhibit TMZ-4 that I filed with my Direct Testimony, but for Arizona instead of Washington. In my Direct Testimony, I indicated I would provide such a table when more relevant data became available.

III. REASONABLENESS OF U S WEST'S COST STUDIES

A. ACTUAL CONSTRUCTION COSTS

Q. DR. HARRIS ARGUES THAT ACTUAL CONSTRUCTION COSTS PER LINE OF $1,492 FOR THE COMPANY AS A WHOLE AND U S WEST'S ESTIMATE OF THE DEAVERAGED COST FOR ARIZONA OF $1,370.83 PROVIDE SOME TYPE OF VALIDATION OF U S WEST'S TELRIC LOOP COST ESTIMATES. DO YOU AGREE?

A. No. The purpose of a TELRIC study is to provide an estimate of the least-cost, forward-looking cost of providing POTS, not the loop costs U S WEST chooses to incur to provide other services, for example, broadband services.

Q. DR. HARRIS ALSO ENDORSES A COMPARISON OF TELRIC LOOP COST ESTIMATES TO MR. DALLAS ELDER'S EMBEDDED COST ESTIMATE FOR LIS-LINK LOOPS. DOES THIS COMPARISON HAVE ANY MERIT?

A. No. First, embedded cost is not a measure of the TELRIC of POTS. Second, it is inappropriate to look backward, instead of forward, to determine the appropriate measure of the TELRIC of the loop. Third, even more disturbing is that Mr. Elder has included numerous, non-embedded costs in his embedded cost estimate. The additional costs for circuit equipment (Account 357C) and the main distribution frame ("MDF") (Account 377C) do not belong in the TELRIC of a loop provided to a U S WEST customer and, thus, do not belong in a loop cost estimate for service to a competitor.

B. LOOP INVESTMENT

Q. ARE THERE OTHER CRITERIA WHICH SHOULD BE USED TO GAUGE THE REASONABLENESS OF THE TELRIC ESTIMATES?

A. Yes. I have prepared Exhibit TMZ-5, to demonstrate that U S WEST's TELRIC estimates are not reasonable. The exhibit reflects my estimate of TELRIC produced with the U S WEST Region Loop Cost Analysis Program ("RLCAP") model, changing several unreasonable assumptions that U S WEST has made. RLCAP is U S WEST's loop cost estimation model. This analysis is similar to the table in Exhibit TMZ-4 attached to my Direct Testimony, which I prepared for the Washington arbitration, but using data for Arizona. With only two restatements of the investment assumptions adopted by U S WEST in its RLCAP model, the removal of unnecessary circuit equipment and the main distribution frame from loop investment and assuming costs of plant placement would be shared, and using reasonable annual cost factors to convert investments into monthly costs, the RLCAP model produces a loop cost estimate for Arizona that is $.80 less than the loop cost estimate of $13.79 produced by the Hatfield Model. This analysis also shows the impact caused by a different assumption about the average cost of placing facilities.

Q. PLEASE EXPLAIN THE COLUMN MARKED "ARIZONA CORPORATION COMMISSION ANNUAL COST FACTOR" ON EXHIBIT TMZ-5.

A. This column shows my approximation of the monthly costs that would occur at each level of incremental investment shown in the first column, using the Arizona Corporation

Commission's ("ACC") prescribed depreciation lives and authorized cost of money. The analysis in Exhibit TMZ-4 for Washington included a presentation of monthly costs based on both U S WEST's preferred depreciation lives and cost of money and the Washington Utility and Transportation Commission's ("WUTC") prescribed lives and authorized rate of return for U S WEST. See TMZ-4 attached to my Direct Testimony. The monthly costs shown in the last column of Exhibit TMZ-5 for Arizona are interpolated between those values. This was necessary because, to the best of my knowledge, U S WEST has not provided Arizona-specific annual cost factors using Arizona-prescribed cost of money and depreciation rates. The resulting Arizona annual cost factors are higher than they would be if the WUTC annual cost factors were used by the interpolated difference in the authorized cost of money in Arizona of 9.75% and the authorized cost of money in Washington of 9.37%. The Arizona Corporation Commission has prescribed depreciation rates similar to the levels adopted in Washington.

Q. WHAT IS THE FIRST RESTATEMENT OF INCREMENTAL INVESTMENTS THAT YOU HAVE MADE?

A. U S WEST's Lis-Link TELRIC estimate reflects a total investment of $1006. The first restatement is the removal of unnecessary investments for circuit equipment and the MDF in the amount of $140.74, which U S WEST has included in its estimate of the Lis-Link TELRIC. The investment level of $865.44 is the actual investment produced by the RLCAP model for Arizona, which includes all of U S WEST's assumptions.

If it takes $865.44 of investment for U S WEST to provide statewide average loop to its own customers, it should also take $865.44 to provide the service to competitors. There is no difference in the service being provided to U S WEST's customers and competitors using the Lis-Link service. This revision in the incremental investment brings down the monthly cost using U S WEST's annual cost factor to no more than $26.37, and my approximation of the ACC's annual cost factor reduces it further to $17.38. This is a conservative restatement of the difference in monthly costs, because the excess plant that has been removed is circuit equipment and central office equipment that have shorter depreciation lives than other loop plant.

I am continuing to attempt to determine the reason why U S WEST has included this extra investment in its Lis-Link study, but have been hampered in that inquiry. U S WEST did not provide the cost study it claims supports the need for such plant on computer readable disks and, thus, no quantitative analysis has been possible. If additional information is provided, I will advise the arbitrator.

Q. WHAT IS THE SECOND RESTATEMENT OF INCREMENTAL INVESTMENTS?

A. The second restatement is an approximation of TELRIC by assuming the costs of plant placement would be shared among three or more parties in a proper scorched node analysis. U S WEST has assumed it would have to pay for all of the cost of placing its plant. This might be true in a short-run analysis, but is inconsistent with the correct long-

run approach required for TELRIC studies. When this plant was originally placed, in general, the structures were shared among several parties, to include gas utilities, electric utilities and sometimes cable TV companies. In a forward-looking study, in the long run, it is appropriate to assume all parties are "scorched;" and, thus, three or more parties would share in placement costs. In the future, those parties would include cable TV companies, new entrants, electric companies, gas utilities and incumbent LEC telecommunications companies. An assumption that three of these various parties would share the costs of placing facilities, if indeed the facilities were scorched, is reasonable and consistent with a pure long run view.

The incremental plant investment of $647 is my estimate of the RLCAP model incremental investment if three parties shared the costs of what U S WEST has called developer trenching, plowing, its own trenching, conduits and poles. The RLCAP is not designed to be modified by users to simulate a sharing of plant placement costs. After considerable effort, this estimate was made by Deloitte & Touche staff under my direction and is a conservative estimate, because we had to change each input price by manual calculations to reflect sharing of costs. If we have overlooked some of the input prices which should have been changed, the incremental investment would be smaller.

Q. ONCE YOU MAKE THESE TWO BASIC CHANGES IN INPUT ASSUMPTIONS, WHAT IS THE LIS-LINK COST?

A. It has dropped to a level that is $.80 less than the unbundled loop cost estimated by the Hatfield Model at ACC prescribed depreciation rates and authorized cost of money.

Q. ARE THERE ANY OTHER FLAWS IN THE INPUT ASSUMPTIONS OF U S WEST'S TELRIC STUDY WHICH SHOULD BE REVISED?

A. Yes. It is clearly appropriate to revise the placement cost assumption which U S WEST has called the "easy/difficult" assumption. To demonstrate the impact of changing the placement assumptions, use of a 50% easy and 50% difficult placement assumption, instead of 18% easy and 82% difficult placement assumption, would reduce the Lis-Link loop cost estimate to $10.58.

Q. HAS U S WEST ALWAYS USED AN 18% EASY/82% DIFFICULT ASSUMPTION?

A. No. Based on my experience reviewing U S WEST cost studies, prior to the passage of the Telecommunications Act of 1996, U S WEST assumed a much larger percentage of easy placement and a much smaller percentage of difficult placement.

Q. WHAT IS U S WEST'S BASIS FOR CHANGING THE "EASY/DIFFICULT" PLACEMENT ASSUMPTION?

A. In her September 25, 1996, testimony, beginning at page 14, Ms. Santos-Rach explains the basis for the "easy/difficult" placement cost assumption. Easy placement was defined as the placement of distribution facilities in new development areas in which the area developer provides trenches. The difficult placement is assumed to be more expensive than the easy placement because it would " . . .entail breaking asphalt streets, boring under sidewalks and digging through gardens and lawns."

A useful way of thinking about the "easy/difficult" issue is recognizing that the "easy" placement cost represents the cost of placing facilities in "undeveloped" areas and the "difficult" placement cost represents the cost of placing facilities in "developed" areas.

The "easy/difficult" ("undeveloped/developed") ratios were determined by comparing the forecasted number of loops with the existing number of loops in place. The number of new loops was determined by forecasting growth in loops over the next five year period. Direct, page 16, line 24. The number of "in-place" loops were assumed to be the difficult placement cost loops. In effect, the "easy" ratio is the percentage of forecasted new loops to total loops (existing and new) and the "difficult" ratio is the percentage of existing loops to the total of new and existing loops.

U S WEST has assumed that it is appropriate to use the same 18% easy ratio (undeveloped ratio) and 82% difficult ratio (developed ratio) in Arizona, as well as all its other states. In effect, the entire easy/difficult placement cost assumption is based on an assumption that loops will grow at 4.0% per year in every state in U S WEST's service territory.

Q. ARE THERE ANY PROBLEMS WITH THE LOGIC THAT THE RLCAP MODEL USES TO ESTIMATE "EASY/DIFFICULT" PLACEMENT COSTS?

A. Yes, we have identified three flaws which occur when U S WEST's RLCAP model is used to implement this concept.

First, the system-wide averages of 18% easy and 82% difficult are inappropriate for Arizona. In a WUTC exhibit prepared by Staff, forecasts made by U S WEST for Arizona in 1992, 1993 and 1994 indicated capital expenditures were forecasted to increase roughly twice as fast as the total for U S WEST. If future growth of loops in Arizona were double the 4.0% rate adopted to establish the "easy/difficult" split in placement costs, based on U S WEST's assumption that all new development is easy, the state-specific easy ratio for Arizona would be 32% instead of 18%, and the difficult ratio would be 68% instead of 82%. As can be seen in exhibit TMZ-5, a change in the easy/difficult assumption would dramatically decrease the loop cost estimate.

Q. WHAT IS THE SECOND PROBLEM YOU HAVE IDENTIFIED?

A. In the scorched node analysis, placement costs could indeed increase in urban areas, but should not increase from the level U S WEST has called "easy" in rural areas. However, U S WEST increases all cable costs by the same dollar cost per sheath-foot -- even if little if any of that cost increase is expected in some areas of Arizona. Exhibit TMZ-6 shows this does not just "average out". The method used in the RLCAP Model to implement the "easy/difficult" assumption causes a disproportionate increase in placement costs in rural areas. Costs per pair-foot in rural areas where 25 pair cables are used increase four times as much as the costs in urban areas where 600 pairs are in the cable sheath. The result is that not only are rural costs per pair increased substantially more than in urban areas, but the increases occur in areas where little, if any, cost increase is actually expected. Supposedly the whole idea of changing the easy/difficult placement cost assumption is to reflect higher costs of "breaking asphalt streets, boring under sidewalks and digging through gardens and lawns". This may be a concern in urban areas, but it is hardly a concern in more rural areas, where gravel driveways replace asphalt, there are few sidewalks, and the logistics of placing loops on farm land do not cause the costs which occur when digging up landscaped urban yards.

Q. WHAT IS YOUR THIRD AREA OF CONCERN WITH U S WEST'S APPLICATION OF "EASY/DIFFICULT" PRICING OF TRENCH AND PLOW COSTS FOR BURIED CABLE?

A. The application of the "easy/difficult" placement assumption for buried cable to all loops is logically inconsistent with the costs of buried cable placed by developers in the RLCAP. Recall that to U S WEST, the term "easy/difficult" is synonymous with the term "undeveloped/developed". The RLCAP model assumes that the 18% easy/82% difficult assumption applies to all types of placement of buried cable, including buried cable placed by developers. But, if buried cable is placed by developers, it will be placed in undeveloped, or easy areas. Placement costs of cable placed by developers should be 100% easy, because it is placed in undeveloped areas by definition.

This logical inconsistency in the RLCAP model is especially critical because a predominant percentage of sheath footage of buried cable is assumed to be placed by developers in the RLCAP model. Distribution Group 1, the most dense area, has no buried cable, so the "easy/difficult" assumption is irrelevant. In Distribution Group 2, 86% of the sheath footage of buried cable is placed by developers. Similarly, in Distribution Groups 3 and 4, of the total sheath footage of buried cable, 94% and 87%, respectively, is assumed to be placed by developers. Placement of buried cable by developers should be 100% easy, not 18% easy, because it is in undeveloped areas by definition. In Distribution Group 5, there is no buried cable placed by developers.

However, Distribution Group 5 is very rural, and there would be very little developed area.

Another logical inconsistency arises with respect to the application of difficult placements by developers. Frequently, when cable is placed by developers, the developer bears the cost of placement, not U S WEST. Consistent with this fact, RLCAP assumes that the cost of easy placement is less costly when placed by a developer, as opposed to U S WEST. However, RLCAP assumes that the full increment of the costs of the 82% difficult placement is borne by U S WEST. In reality, when the developer bears the costs, it bears the costs of both easy placement and difficult placement and U S WEST bears none.

IV. CONCLUSION

Q. WHAT CONCLUSIONS HAVE YOU REACHED ABOUT U S WEST'S CHANGE IN THE "EASY/DIFFICULT" PLACEMENT ASSUMPTION?

A. The company's change in the easy/difficult assumption produces an unwarranted and dramatic increase in loop investment. RLCAP is a huge, but crude, model that does not have the structure necessary to recognize and allow for differences in placement costs in urban and rural areas. Thus, it is not suited to implement reliable cost estimates based on the easy/difficult placement cost assumption that U S WEST has indicated is critical for proper cost estimates. By contrast, the Hatfield Model is constructed in such a way that

it estimates higher costs in urban areas and relatively lower costs in rural areas and, thus, properly reflects the concern that Dr. Harris has raised.

Q. WHAT DO YOU CONCLUDE REGARDING U S WEST'S LOOP INVESTMENT?

A. U S WEST's loop investment in its TELRIC for loops is over-stated and unreasonable for the reasons I have stated in my testimony, and the resulting TELRIC should not be relied on to set the rates for unbundled loops.

Q. DOES THIS CONCLUDE THIS PREFILED REBUTTAL TESTIMONY?

A. Yes.

Exhibit TMZ-5

RESTATED U S WEST TELRIC INVESTMENT AND MONTHLY COSTS FOR LIS-LINK IN ARIZONA

	Investment	U S WEST Annual Cost Factor	Arizona Corporation Commission Annual Cost Factor_a/
U S WEST STUDY	$1,006	$30.67	$20.21
RESTATEMENTS			
LESS unnecessary investment facilities for Lis-Link_b/	$865	$26.37	$17.38
LESS plant investment not required if placement costs are shared_c/	$647	$19.72	$12.99
EFFECT on plant investment assumed for statewide placements priced at 50% easy and 50% difficult_c/	$527	$16.06	$10.58

NOTES AND SOURCES;

_a/ Approximation based on differences in costs of money authorized in Washington and Arizona.

_b/ Run of RLCAP for Arizona using US WEST assumptions.

_c/ Alternative runs of US WEST RLCAP made by going into RLCAP spreadsheets to change indicated assumptions.

Exhibit TMZ-6

EXAMPLE OF IMPACT OF DIFFICULT PLACEMENT COSTS ON DIFFERENT DISTRIBUTION DENSITY GROUPS

	Density Group	
	Medium	Very Low
Pair Size Copper Cable	600	25
CABLE COST - EASY PLACEMENT		
Cost per Foot		
Trench	$12.00	$3.00
Plow	$11.00	$2.00
Cost per Pair Foot		
Trench	0.02	0.12
Plow	0.018333333	0.08
INCREMENTAL COST TO 18% EASY, 82% DIFFICULT		
Cost per Foot		
Trench	$6.00	$6.00
Plow	$3.50	$3.50
Cost per Pair Foot		
Trench	0.01	0.24
Plow	0.005833333	0.14
IMPLIED PERCENTAGE INCREASES		
Trench	50.00%	200.00%
Plow	31.82%	175.00%

NJB - 1 (revised)

SCHEDULE 1
TARIFFS SUBJECT TO WHOLESALE DISCOUNT OF 36.14%
ARIZONA

U S WEST Communications Exchange & Network Services Tariff	1. Application and Reference *All subsections*	
	2. General Regulations *All subsections*	
	3. Service Charges *All subsections*	
	4. Construction Charges & Other Special Charges *All subsections*	
	5. Exchange Services *All subsections*	
	105. Obsolete Exchange Services *All subsections*	
	6. Message Telecommunication Service *All subsections*	
	106. Obsolete Message Telecommunication Services *All subsections*	
	7. Wide Area Telecommunication Service *All subsections*	
	8. Connections of Premises Equipment To Telecommunications Services *All subsections*	
	9. Central Office Services *All subsections*	
	109. Obsolete Central Office Services *All subsections*	
	10. Misc. Service Offerings *All subsections*	
	110. Obsolete Misc. Service Offerings *All subsections*	
	11. Pole Attachments *All subsections*	

SCHEDULE 1
TARIFFS SUBJECT TO WHOLESALE DISCOUNT OF 36.14%
ARIZONA

U S WEST Communications Exchange & Network Services Tariff (continued)	12. Open Network Architecture (ONA) Services *Note: The (ONA) Service tariff section references other tariffs and sections which are listed in this exhibit. Wholesale discounts for referenced tariffed services apply to ONA*	
		13. Reserved
	14. Integrated Services Digital Network *All subsections*	
	15. Miscellaneous Switched Digital Services *All subsections*	
		16. - 19. Reserved
	20. Facilities for Radio Carriers *All subsections*	
		21. - 24. Reserved
	25. Customized Services *All subsections*	
	125 Obsolete Customized Services *All subsections*	
U S WEST Communications Private Line Transport Services Tariff	*Entire tariff, sections 1. through 6.*	
U S WEST Communications Competitive Advanced Communications Services Tariff	*Entire tariff: sections 1 - through 6.*	
U S WEST Communications Competitive Private Line Transport Services Tariff	*Entire tariff, sections 1. through 5.*	
U S WEST Communications Competitive Exchange and Network Services Tariff	*Entire tariff*	
Other Retail Services Deregulated	All retail services provided by U S WEST	
Other Retail Services Unregulated	All retail services provided by U S WEST	
Other Retail Services Detariffed	All retail services provided by U S WEST	

NJB - 1 (revised)

SCHEDULE 1
TARIFFS SUBJECT TO WHOLESALE DISCOUNT OF 36.14%
ARIZONA

U S WEST Communications Exchange & Network Services Tariff	1. Application and Reference *All subsections*	
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	3. Service Charges *All subsections*	
	4. Construction Charges & Other Special Charges *All subsections*	
	5. Exchange Services *All subsections*	
	105. Obsolete Exchange Services *All subsections*	
	6. Message Telecommunication Service *All subsections*	
	106. Obsolete Message Telecommunication Services *All subsections*	
	7. Wide Area Telecommunication Service *All subsections*	
	8. Connections of Premises Equipment To Telecommunications Services *All subsections*	
	9. Central Office Services *All subsections*	
	109. Obsolete Central Office Services *All subsections*	
	10. Misc. Service Offerings *All subsections*	
	110. Obsolete Misc. Service Offerings *All subsections*	
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		21. - 24. Reserved
	25. Customized Services *All subsections*	
	125 Obsolete Customized Services *All subsections*	
U S WEST Communications Private Line Transport Services Tariff	*Entire tariff, sections 1 through 6*	
U S WEST Communications Competitive Advanced Communications Services Tariff	*Entire tariff, sections 1 - through 6.*	
U S WEST Communications Competitive Private Line Transport Services Tariff	*Entire tariff, sections 1 through 5*	
U S WEST Communications Competitive Exchange and Network Services Tariff	*Entire tariff*	
Other Retail Services Deregulated	All retail services provided by U S WEST	
Other Retail Services Unregulated	All retail services provided by U S WEST	
Other Retail Services Detariffed	All retail services provided by U S WEST	