

**Composite Expense Data
(Millions of Dollars)**

Year	Depreciation	Labor	Services	Materials	Rents	Total
1984	\$10,265,689,748	22,413,559,353	4,495,625,732	5,237,462,371	1,343,619,297	43,755,956,501
1985	\$11,817,980,828	22,340,695,821	5,230,444,585	5,311,177,514	1,523,069,503	46,223,368,251
1986	\$13,615,786,710	21,927,445,357	6,052,079,753	5,228,845,728	1,289,691,939	48,113,849,487
1987	\$15,478,125,567	21,867,842,254	6,325,079,902	4,813,975,473	1,077,258,884	49,562,282,080
1988	\$15,848,891,000	22,019,313,282	7,404,883,055	7,926,299,218	1,168,166,445	54,367,553,000
1989	\$16,105,368,000	22,103,815,226	8,949,271,737	8,235,372,232	1,159,904,805	56,553,732,000
1990	\$16,237,730,000	22,470,471,358	8,981,521,609	8,651,562,574	1,187,602,459	57,528,888,000
1991	\$15,758,422,000	23,105,953,636	9,977,390,961	8,870,661,199	1,148,176,204	58,860,604,000
1992	\$16,085,868,000	22,940,901,651	8,858,615,401	9,433,336,948	1,211,614,000	58,530,336,000
1993	\$16,421,727,000	24,799,853,000	11,616,889,928	7,383,777,072	1,226,589,000	61,448,836,000

Operating Revenues

	Composite (000)									
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Local	28,849,107	30,589,731	32,361,398	32,735,373	32,684,393	33,453,940	34,512,828	35,950,646	37,420,938	39,093,644
Intersate Access										
End User	612,763	1,678,437	2,707,396	3,501,265	4,074,431	4,991,358	5,307,141	5,477,774	5,629,936	5,976,718
Switched	12,543,714	12,604,240	12,129,158	11,289,167	11,428,553	10,795,895	10,192,553	10,083,865	10,207,635	10,547,770
Special	2,103,858	2,103,988	2,744,216	2,845,024	2,766,891	2,473,426	2,434,221	2,337,239	2,375,499	2,316,636
Intrastate Access	4,788,749	5,128,208	5,158,972	5,289,774	5,387,318	5,411,128	5,531,853	5,613,291	5,769,455	6,049,613
Toll (Total)	10,539,375	10,654,774	11,362,760	12,006,235	12,846,252	13,004,172	12,923,549	12,358,912	11,902,761	12,039,418
Miscellaneous (Total)	7,142,088	6,614,035	5,606,855	5,017,635	7,274,024	7,741,898	7,889,680	8,244,883	7,817,687	8,236,826
Total	65,002,692	68,894,397	71,549,440	72,044,383	75,816,676	77,150,619	78,016,517	79,128,087	80,163,044	84,260,625
Adjustments										
Nonreg	233,737	403,412	457,377	1,101,956						
Special Access Adjust	1,113,144									
Billed Revenue Totals										
Intrastate Access	\$5,474,682	\$5,836,196	\$5,795,047	\$5,844,936	\$5,928,083	\$5,938,211	\$5,838,884	\$5,891,410	\$5,787,328	\$5,942,668
Toll	\$11,101,053	\$10,954,864	\$11,716,681	\$12,390,283	\$13,013,853	\$13,344,224	\$13,183,984	\$12,579,895	\$12,083,024	\$11,863,507

Rate Changes for Intrastate Price Indexes
LOCAL REVENUES – RBOCS + SNET

YEAR	CREDIT AMOUNTS	BOOKED REVENUE	ANNUALIZED REV CHANGE	EFFECTIVE REV CHANGE
1984	(\$11,236,014)	\$25,775,420,158	\$2,078,331,648	\$1,170,046,419
1985	(\$1,192,853)	\$27,477,280,341	\$901,047,575	\$362,731,700
1986	(\$39,352,533)	\$29,134,054,309	\$318,709,182	\$306,435,486
1987	(\$175,772,961)	\$29,629,046,820	(\$196,226,863)	(\$62,235,584)
1988	(\$58,661,601)	\$29,650,767,000	(\$260,782,783)	(\$171,010,729)
1989	(\$99,362,953)	\$30,420,331,000	(\$420,744,910)	(\$351,230,657)
1990	(\$54,057,123)	\$31,146,843,000	(\$673,225,668)	(\$635,913,651)
1991	(\$20,996,874)	\$32,550,606,000	\$334,053,316	\$349,531,090
1992	(\$26,691,378)	\$33,861,723,000	(\$157,882,230)	(\$61,609,825)
1993	(\$12,299,000)	\$35,143,442,000	\$197,774,080	\$137,826,429

TOLL REVENUES – RBOCS + SNET

YEAR	CREDIT AMOUNTS	BOOKED REVENUE	ANNUALIZED REV CHANGE	EFFECTIVE REV CHANGE
1984	(\$800,000)	\$9,013,834,991	\$120,897,298	\$73,941,319
1985	\$453,030	\$9,020,026,345	\$119,551,899	\$56,632,837
1986	(\$320,872)	\$9,558,748,223	(\$128,974,020)	(\$90,300,983)
1987	(\$34,086,939)	\$10,230,953,016	(\$309,414,790)	(\$162,072,343)
1988	(\$4,208,968)	\$11,036,637,000	(\$181,892,907)	(\$100,227,289)
1989	(\$8,556,568)	\$10,931,507,000	(\$481,389,470)	(\$380,554,000)
1990	\$19,797,000	\$10,940,640,000	(\$624,540,658)	(\$279,359,270)
1991	\$0	\$10,426,330,000	(\$34,597,098)	(\$12,642,366)
1992	\$0	\$10,081,703,000	(\$203,553,850)	(\$133,379,094)
1993	(\$1,500,000)	\$10,191,364,000	(\$236,456,957)	(\$138,851,447)

INTRASTATE ACCESS REVENUES – RBOCS + SNET

YEAR	CREDIT AMOUNTS	BOOKED REVENUE	ANNUALIZED REV CHANGE	EFFECTIVE REV CHANGE
1984	(\$83,411,000)	\$4,144,967,541	\$733,557,303	\$504,734,470
1985	\$0	\$4,321,440,649	(\$112,536,352)	(\$37,555,828)
1986	\$330,000	\$4,301,715,129	(\$107,185,704)	(\$75,394,442)
1987	(\$37,103,600)	\$4,277,223,581	(\$238,013,773)	(\$195,789,742)
1988	(\$181,850)	\$4,326,751,000	(\$111,038,913)	(\$82,313,419)
1989	(\$1,829,535)	\$4,318,962,000	(\$154,087,164)	(\$96,076,094)
1990	(\$14,860,000)	\$4,437,204,000	(\$337,289,830)	(\$110,650,020)
1991	(\$91,054,750)	\$4,460,023,000	(\$91,054,750)	(\$56,230,318)
1992	(\$3,053,622)	\$4,512,028,000	(\$160,531,818)	(\$90,092,803)
1993	(\$1,430,000)	\$4,655,729,000	(\$233,629,723)	(\$98,470,455)

Total Taxes = RBOCs + SNET + GTE

Year	Operating investment tax credits – net	Operating Federal Income Taxes	Operating State and Local Income Tax	Combined Federal & State Income Taxes	Gross Receipts Taxes	Capital Stock Taxes
1984	547,751,112	2,264,899,077	607,570,569	2,872,469,646	1,428,673,639	2,237,135,845
1985	651,585,237	2,733,764,211	749,445,003	3,483,209,214	1,267,415,086	2,317,762,685
1986	(245,551,632)	4,262,968,635	761,455,862	5,024,424,497	1,329,948,816	2,381,023,372
1987	(819,204,969)	4,998,492,924	801,246,072	5,799,738,996	1,223,529,150	2,509,863,527
1988	(855,974,000)	4,387,621,000	749,594,000	5,137,215,000	1,380,513,305	2,510,516,761
1989	792,010,000	3,774,425,000	616,562,000	4,390,987,000	1,270,517,771	2,663,165,189
1990	715,384,000	4,286,718,000	657,171,000	4,943,889,000	1,238,418,896	2,754,153,445
1991	653,496,000	4,428,617,722	744,392,000	5,173,009,722	1,356,709,428	2,757,140,021
1992	591,041,244	4,877,042,170	681,303,000	5,558,345,170	1,387,051,000	2,453,909,676
1993	547,212,000	5,497,098,000	779,194,000	6,276,292,000	1,410,704,000	2,686,791,000

Switched Access

1. Original Data

	Minutes of Use			Revenues		
	Common Line	Traffic Sensitive		Common Line	Traffic Sensitive	Total
1984/85	183,602,357	183,108,361	1984/85	\$10,172,842	\$5,461,496	\$15,634,338
1985/86	199,946,832	199,487,105	1985/86	\$10,878,568	\$6,562,000	\$17,440,568
1986/87	198,878,262	226,888,173	1986/87	\$10,213,735	\$7,102,456	\$17,316,191
1988	244,467,327	266,721,218	1988	\$10,012,595	\$8,231,744	\$18,244,339
1989	279,513,375	295,439,187	1989	\$9,807,040	\$8,637,220	\$18,444,260
1990	305,839,946	313,182,502	1990	\$9,568,617	\$8,492,946	\$18,061,563
1991	326,675,691	330,060,199	1991	\$9,395,161	\$8,609,845	\$18,005,006
1992	349,305,191	349,150,487	1992	\$9,481,498	\$9,054,015	\$18,535,513
1993	371,045,964	370,262,787	1993	\$10,414,488	\$9,099,241	\$19,513,729

2. Allocated MOU. 1984-87

	Allocated MOU		Allocated Revenues		
	Common Line	Traffic Sensitive	Common Line	Traffic Sensitive	Total
1984	91,801,179	91,554,181	5,086,421	2,730,748	\$7,817,169
1985	191,774,595	191,297,733	10,525,705	6,011,748	\$16,537,453
1986	199,412,547	213,187,639	10,546,152	6,832,228	\$17,378,380
1987	99,439,131	113,444,087	5,106,868	3,551,228	\$8,658,096
1988**	244,467,327	266,721,218	10,012,595	8,231,744	\$18,244,339

**1988 is actual, not allocated

3. Interpolated MOU

	Interpolated MOU		Interpolated Revenues		
	Common Line	Traffic Sensitive	Common Line Less SLC	Traffic Sensitive	Total
1984	184,429,193	171,655,462	\$9,923,908	\$5,329,870	\$15,253,778
1985	191,774,595	191,297,733	\$8,665,016	\$6,011,748	\$14,676,764
1986	199,412,547	213,187,639	\$7,551,083	\$6,832,228	\$14,383,311
1987	219,723,302	237,067,988	\$3,835,746	\$7,468,811	\$11,304,556
1988	244,467,327	266,721,218	\$5,513,422	\$8,231,744	\$13,745,166
1989	279,513,375	295,439,187	\$4,147,033	\$8,637,220	\$12,784,253
1990	305,839,946	313,182,502	\$3,670,823	\$8,492,946	\$12,163,769
1991	326,675,691	330,060,199	\$3,351,406	\$8,609,845	\$11,961,251
1992	349,305,191	349,150,487	\$3,267,909	\$9,054,015	\$12,321,924
1993	371,045,964	370,262,787	\$3,872,098	\$9,099,241	\$12,971,339

ACCESS LINES - SWITCHED

Total

1984	100,571,936
1985	103,631,092
1986	106,197,548
1987	109,393,436
1988	111,560,027
1989	114,951,962
1990	117,998,102
1991	121,887,061
1992	123,820,793
1993	124,600,980

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WASHINGTON, D.C. 20554

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GENERAL COUNSEL

January 20, 1995

Frank McKennedy, Director - Policy Analysis
United States Telephone Association
900 19 Street, N.W., Suite 800
Washington, D.C. 20006-2190

Re: Productivity information submitted in CC Docket No. 94-1.

Dear Mr. McKennedy:

On May 10, 1994, the United States Telephone Association (USTA) submitted Comments in Docket 94-1 which contained a study of total factor productivity of the local exchange carriers (LECs) subject to price cap regulations. This study, "Productivity of the Local Telephone Operating Companies Subject to Price Cap Regulation," by Laurits R. Christensen, Philip E. Schoech, and Mark E. Meitzen (Christensen Study), was included as Attachment 6 to USTA's Comments. In order to assist the Bureau Staff in review of the Christensen Study, USTA is requested to provide the following information.

In reviewing the Christensen Study, we have determined that assumptions about specific parameters affect the total factor productivity ("TFP") growth rate. In order to measure the sensitivity of TFP growth to changes in these assumptions, we request that total factor productivity growth be calculated separately under each of the following scenarios.

1. (a) Calculate the growth in TFP assuming the FCC authorized rate of return (ROR) as the cost of capital for each year.
1. (b) Calculate the growth in TFP assuming FCC depreciation rates for each year of the study.
2. (a) Calculate the growth in TFP assuming an increase of the Economic Stock Adjustment Factor for communications equipment from 0.5641 to .6641; an increase of the Economic Stock Adjustment Factor for other equipment from 0.5168 to 0.6168; and an increase of the Economic Stock Adjustment Factor for structures from 0.8036 to 0.9036.
2. (b) Calculate the growth in TFP assuming an increase of the Economic Stock Adjustment Factor for communications equipment from 0.5641 to 1.0; an increase of the Economic Stock Adjustment Factor for other equipment from 0.5168 to 1.0; and an increase of the Economic Stock Adjustment Factor for structures from

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0.8036 to 1.0.

GENERAL COUNSEL

3. Calculate 5 year rolling averages for the rate of growth of LEC TFP and for the rate of growth of United States private business sector TFP from 1984 to 1992. Also, calculate 5 year rolling averages for the rate of growth of total input LEC prices and 5 year rolling averages of the rate of growth of United States private business sector input prices from 1984 to 1992. Include complete individual time series as well as rolling averages.

4. Calculate the rate of growth of TFP under combined scenarios 1(a), 1(b), and 2(a). Calculate the rate of growth of TFP under combined scenarios 1(a), 1(b), and 2(b).

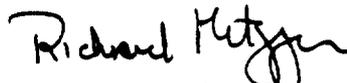
5. Calculate 5 year rolling averages for both the rate of growth of TFP and for the rate of growth of total input prices from 1984 to 1992 and under combined scenarios 1(a), 1(b) and 2(a). Calculate 5 year rolling averages for both the rate of growth of TFP and for the rate of growth of total input prices from 1984 to 1992 and under combined scenarios 1(a), 1(b) and 2(b).

6. Calculate the rate of growth of TFP for scenarios 1 through 5, adding the 1993 data point.

7. Calculate the rate of growth of TFP for scenarios 1 through 5, adding the 1993 data point and excluding the 1984 data point.

Provide the results on paper and disk. In addition to data, the disk should contain lotus worksheets of formulas and explanations. Responses are due as soon as possible, but in no event later than January 30, 1995.

Yours truly,



A. Richard Metzger, Jr.
Deputy Bureau Chief, Operations
Common Carrier Bureau



United States Telephone Association

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January 31, 1995

**FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY**

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street NW - Room 222
Washington, D.C. 20554

RE: Ex Parte Filing
CC Docket No. 94-1

Dear Mr. Caton:

Attached is the United States Telephone Association's (USTA) response to a letter from Richard Metzger, Deputy Bureau Chief, Operations, Common Carrier Bureau dated January 20, 1995 to Frank McKennedy, Director - Policy Analysis for USTA. Mr. Metzger sought certain sensitivity analyses of the Christensen Associates TFP study filed by USTA in this proceeding. USTA has reservations concerning the economic and empirical value of some of the items requested. However, USTA commissioned Christensen Associates to develop the attached response.

Included in the USTA response are a cover page providing an explanation of the attached analyses, two pages for each analysis submitted including the addition of a combined analysis of items 1(a) and 1(b) of Mr. Metzger's letter. Further, USTA commissioned Christensen Associates to provide alternative runs of Items 2(a) and 2(b) which are also included.

With regard to Item 1(b) of the Metzger letter, USTA has determined that a large share of the information necessary to perform this analysis is not readily available. Further, if the base information is obtainable at all, it will require some time to develop usable data to perform the analysis. As a result, USTA proposed to the Tariff Division Staff a workable alternative until the availability of the needed information is determined.

Generally, Item 1(b) requires the development of industry composite interstate depreciation rates for each year used in the TFP study. USTA is currently investigating the availability of this data for the large number of LEC study areas involved and the time it would take to compile industry composite depreciation

rates. USTA will advise Mr. Metzger and the Tariff Division staff when this has been determined. In the interim, USTA directed Christensen Associates to use the 1993 composite industry depreciation rates with appropriate study adjustments as described in the narrative.

A copy of this ex parte filing, the attachment and two machine readable disks are being filed in the Office of the Secretary on January 31, 1995. The same is being provided to ITS. Please include this notice and attached material in the public record of these proceedings.

Respectfully Submitted



Mary McDermott
Vice President and General
Counsel

cc: Mark Uretsky
Dr. Anthony Bush
Alexander Belinfante

4611 University Avenue
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Madison, Wisconsin 53705-2164

608 231 2066
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January 31, 1995

The attached tables and enclosed diskettes represent Christensen Associates' response to the January 20, 1995 data request by Richard Metzger of FCC. Each of the attached tables responds to the various changes in parameter values for cost of capital, depreciation, and economic stock adjustment factor outlined in questions 1(a), 1(b), 2(a), 2(b) and 4. The tables also provide responses to questions 3, 5, 6, and 7 regarding 5-year rolling averages and average annual growth rates over various subperiods of the study (i.e., 1984-92, 1984-93, and 1985-93).

A separate Lotus worksheet has been created for each of the attached tables and the summary information contained on the paper copies is found in the range B:P1 to B:AB42 of each worksheet. The worksheet name corresponds to the question being responded to. For example, Q1A.WK3 is the response to question 1(a). Each worksheet contains four sheets. Sheet A contains the TFP calculations as performed on our PROD.WK3 worksheet from the workpapers for our 1993 study. Sheet B contains the summary information and computation of the rolling averages as exhibited on the attached tables. Sheets C and D contain the computation of the capital input and capital cost values using the alternative parameter values.

Note that scenarios involving 1(b), FCC depreciation rates, also involve changes to the economic stock adjustment factor. This is because the stock adjustment factor essentially embodies the depreciation of assets up to 1984. Consistency requires that if 1984-93 depreciation rates are changed, the pre-1984 depreciation rates must also be changed. Therefore, while we still retain the same approach to computing the stock adjustment factors, their values will change under 1(b).

In addition to the scenarios requested in the January 20 Metzger letter, we have run some additional scenarios. First, scenarios 1(a) (FCC authorized rate of return) and 1(b) (FCC depreciation rates) have been run together. Alternatives have also been run for the economic stock adjustment factors in 2(a) and 2(b). Unlike 1(a) and 1(b), which represent fact-based alternative parameter values, 2(a) and 2(b) are simply numerical exercises with no economic or empirical basis. Therefore, we ran alternatives that provide a balanced range of alternative economic stock adjustment factors. Scenario 2(a) (worksheet Q2A2.WK3) subtracts 0.1 from each of the adjustment factors to balance the addition of 0.1 found in 2(a). Scenario 2(b) (worksheet Q2B2.WK3) sets each of the adjustment factors at 0.2 (the lowest value possible without obtaining negative capital stocks) to balance the setting of each factor at 1.0 in 2(a).

PARAMETER VALUES	1993 STUDY VALUES
COST OF CAPITAL	Study Values
DEPRECIATION	Study Values
STOCK ADJUSTMENT	Study Values

	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1984						
1985	1.1%	0.5%	0.6%	0.1%	4.0%	-3.9%
1986	2.8%	1.0%	1.8%	1.3%	3.8%	-2.5%
1987	1.8%	0.1%	1.7%	1.7%	3.1%	-1.4%
1988	2.1%	0.6%	1.5%	-3.2%	4.4%	-7.6%
1989	2.0%	-0.3%	2.3%	-3.7%	4.1%	-7.8%
1990	4.6%	-0.3%	4.9%	11.9%	4.2%	7.7%
1991	1.2%	-1.1%	2.3%	1.3%	2.9%	-1.6%
1992	3.5%	1.9%	1.6%	4.4%	5.1%	-0.7%
*1993	2.6%			-3.5%		.
*US numbers not available for 1993						
Avg 84-92	2.4%	0.3%	2.1%	1.7%	4.0%	-2.2%
Avg 84-93	2.4%			1.2%		
Avg 85-93	2.6%			1.3%		

FIVE-YEAR ROLLING AVERAGES

5-year avg ending in	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1989	2.0%	0.4%	1.6%	-0.7%	3.9%	-4.6%
1990	2.7%	0.2%	2.5%	1.6%	3.9%	-2.3%
1991	2.4%	-0.2%	2.6%	1.6%	3.7%	-2.1%
1992	2.7%	0.2%	2.5%	2.2%	4.1%	-2.0%
**1993	2.8%	0.2%	2.6%	2.1%	4.1%	-2.0%

**1993 US numbers are latest 5-year average

This scenario presents the results of the Christensen Associates 1993 update of the LEC TFP study. Parameter values for cost of capital, depreciation, and economic stock adjustment are set at their study values.

FOOTNOTE CONTINUED ON NEXT PAGE

FOOTNOTE TO STUDY VALUE SCENARIO – CONTINUED

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

PARAMETER VALUES	QUESTION 1(a)
COST OF CAPITAL	1(a): FCC ROR
DEPRECIATION	Study Values
STOCK ADJUSTMENT	Study Values

	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1984						
1985	1.1%	0.5%	0.6%	3.9%	4.0%	-0.1%
1986	2.6%	1.0%	1.6%	7.4%	3.8%	3.6%
1987	1.7%	0.1%	1.6%	-1.1%	3.1%	-4.2%
1988	2.1%	0.6%	1.5%	-4.1%	4.4%	-8.5%
1989	2.0%	-0.3%	2.3%	-1.5%	4.1%	-5.6%
1990	4.5%	-0.3%	4.8%	11.2%	4.2%	7.0%
1991	1.1%	-1.1%	2.2%	0.8%	2.9%	-2.1%
1992	3.3%	1.9%	1.4%	5.8%	5.1%	0.7%
*1993	2.5%			-0.9%		.
*US numbers not available for 1993						
Avg 84-92	2.3%	0.3%	2.0%	2.8%	4.0%	-1.2%
Avg 84-93	2.3%			2.4%		
Avg 85-93	2.5%			2.2%		

FIVE-YEAR ROLLING AVERAGES						
5-year avg ending in	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1989	1.9%	0.4%	1.5%	0.9%	3.9%	-3.0%
1990	2.6%	0.2%	2.3%	2.4%	3.9%	-1.5%
1991	2.3%	-0.2%	2.5%	1.1%	3.7%	-2.7%
1992	2.6%	0.2%	2.4%	2.4%	4.1%	-1.7%
**1993	2.7%	0.2%	2.5%	3.1%	4.1%	-1.1%
**1993 US numbers are latest 5-year average						

This scenario changed the cost of capital for each year from Moody's yield on public utility bonds to the FCC authorized rate of return. Christensen Associates selected Moody's yield on public utility bonds because it is a widely and is easily verified. If the FCC authorized rate of return is used, average annual TFP growth for the LECs becomes lower over the 1984-1992 period. (FOOTNOTE TO SCENARIO 1(a) CONTINUED ON NEXT PAGE)

FOOTNOTE TO SCENARIO 1(a) – CONTINUED

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

Christensen 1993 LEC TFP Update – Sensitivity Analysis

PARAMETER VALUES	QUESTION 1(b)
COST OF CAPITAL	Study Values
DEPRECIATION	1(b): FCC 93
STOCK ADJUSTMENT	Study Values*

	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1984						
1985	1.0%	0.5%	0.5%	0.5%	4.0%	-3.5%
1986	2.9%	1.0%	1.9%	2.0%	3.8%	-1.8%
1987	1.8%	0.1%	1.7%	1.6%	3.1%	-1.5%
1988	2.1%	0.6%	1.5%	-1.5%	4.4%	-5.9%
1989	2.0%	-0.3%	2.3%	-3.4%	4.1%	-7.5%
1990	4.7%	-0.3%	5.0%	9.8%	4.2%	5.6%
1991	1.2%	-1.1%	2.3%	2.2%	2.9%	-0.7%
1992	3.5%	1.9%	1.6%	3.8%	5.1%	-1.3%
*1993	2.7%			-3.4%		
*US numbers not available for 1993						
Avg 84-92	2.4%	0.3%	2.1%	1.9%	4.0%	-2.1%
Avg 84-93	2.4%			1.3%		
Avg 85-93	2.6%			1.4%		

FIVE-YEAR ROLLING AVERAGES						
5-year avg ending in	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1989	2.0%	0.4%	1.6%	-0.2%	3.9%	-4.1%
1990	2.7%	0.2%	2.5%	1.7%	3.9%	-2.2%
1991	2.4%	-0.2%	2.6%	1.7%	3.7%	-2.0%
1992	2.7%	0.2%	2.5%	2.2%	4.1%	-2.0%
**1993	2.8%	0.2%	2.7%	1.8%	4.1%	-2.3%
**1993 US numbers are latest 5-year average						

The original request for this scenario was to change depreciation rates from the economic rates of replacement to FCC prescribed depreciation rates. This would require depreciation rates from the 1984-1993 period and the pre-1984 period. USTA was unable to provide Christensen Associates with the industry average FCC prescribed rates. Thus, the sensitivity analysis was performed by using the 1993 FCC depreciation rates for every year of the study. Note that changes to the 1984-1993 depreciation rates also involve changes to the economic stock adjustment factor because the stock adjustment factor embodies the depreciation of assets up to 1984. Consistency requires that if 1984-1993 depreciation rates change, the pre-1984 rates must also be changed. Therefore, while we still retain the same approach to computing the stock adjustment factors, their values will change under 1(b).

FOOTNOTE TO SCENARIO 1(b) CONTINUED ON NEXT PAGE

FOOTNOTE TO SCENARIO 1(b) – CONTINUED

5-year rolling averages for TFP are also calculated. The FCC also requested 5-year rolling averages of LEC total input prices and 5-year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

Christensen 1993 LEC TFP Update – Sensitivity Analysis

PARAMETER VALUES	QUESTION 1(a) PLUS 1(b)
COST OF CAPITAL	1(a): FCC ROR
DEPRECIATION	1(b): FCC 93
STOCK ADJUSTMENT	Study Values*

	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1984						
1985	1.0%	0.5%	0.5%	3.9%	4.0%	-0.1%
1986	2.7%	1.0%	1.7%	7.5%	3.8%	3.7%
1987	1.7%	0.1%	1.6%	-1.0%	3.1%	-4.1%
1988	2.1%	0.6%	1.5%	-2.4%	4.4%	-6.8%
1989	2.0%	-0.3%	2.3%	-1.5%	4.1%	-5.6%
1990	4.5%	-0.3%	4.8%	9.2%	4.2%	5.0%
1991	1.1%	-1.1%	2.2%	1.7%	2.9%	-1.2%
1992	3.3%	1.9%	1.4%	5.0%	5.1%	-0.1%
*1993	2.5%			-1.1%		
*US numbers not available for 1993						
Avg 84–92	2.3%	0.3%	2.0%	2.8%	4.0%	-1.1%
Avg 84–93	2.3%			2.4%		
Avg 85–93	2.5%			2.2%		

FIVE–YEAR ROLLING AVERAGES

5–year avg ending in	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1989	1.9%	0.4%	1.5%	1.3%	3.9%	-2.6%
1990	2.6%	0.2%	2.4%	2.4%	3.9%	-1.6%
1991	2.3%	-0.2%	2.5%	1.2%	3.7%	-2.5%
1992	2.6%	0.2%	2.4%	2.4%	4.1%	-1.7%
**1993	2.7%	0.2%	2.5%	2.7%	4.1%	-1.5%

**1993 US numbers are latest 5–year average

This scenario combines scenario 1(a) on cost of capital and scenario 1(b) on depreciation.

Scenario 1(a)

This scenario changed the cost of capital for each year from Moody's yield on public utility bonds to the FCC authorized rate of return. Christensen Associates selected Moody's yield on public utility bonds because it is a widely and is easily verified. If the FCC authorized rate of return is used, average annual TFP growth for the LECs becomes lower over the 1984–1992 period. (FOOTNOTE TO SCENARIOS 1(a) AND 1(b) CONTINUED ON NEXT PAGE)

FOOTNOTE TO SCENARIOS 1(a) PLUS 1(b) – CONTINUED

Scenario 1(b)

The original request for this scenario was to change depreciation rates from the economic rates of replacement to FCC prescribed depreciation rates. This would require depreciation rates from the 1984–1993 period and the pre–1984 period. USTA was unable to provide Christensen Associates with the industry average FCC prescribed rates. Thus, the sensitivity analysis was performed by using the 1993 FCC depreciation rates for every year of the study. Note that changes to the 1984–1993 depreciation rates also involve changes to the economic stock adjustment factor because the stock adjustment factor embodies the depreciation of assets up to 1984. Consistency requires that if 1984–1993 depreciation rates change, the pre–1984 rates must also be changed. Therefore, while we still retain the same approach to computing the stock adjustment factors, their values will change under 1(b)

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

PARAMETER VALUES	QUESTION 2(a)
COST OF CAPITAL	Study Values
DEPRECIATION	Study Values
STOCK ADJUSTMENT	2(a): Add 0.1

	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1984						
1985	1.7%	0.5%	1.2%	-0.2%	4.0%	-4.2%
1986	3.3%	1.0%	2.3%	1.0%	3.8%	-2.8%
1987	2.4%	0.1%	2.3%	1.8%	3.1%	-1.3%
1988	2.6%	0.6%	2.1%	-3.3%	4.4%	-7.7%
1989	2.4%	-0.3%	2.7%	-3.9%	4.1%	-8.0%
1990	4.9%	-0.3%	5.2%	12.4%	4.2%	8.2%
1991	1.5%	-1.1%	2.6%	1.2%	2.9%	-1.7%
1992	3.7%	1.9%	1.8%	4.6%	5.1%	-0.5%
*1993	2.8%			-3.8%		.
*US numbers not available for 1993						
Avg 84-92	2.8%	0.3%	2.5%	1.7%	4.0%	-2.2%
Avg 84-93	2.8%			1.1%		
Avg 85-93	3.0%			1.3%		

	FIVE-YEAR ROLLING AVERAGES					
5-year avg ending in	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1989	2.5%	0.4%	2.1%	-0.9%	3.9%	-4.8%
1990	3.1%	0.2%	2.9%	1.6%	3.9%	-2.3%
1991	2.8%	-0.2%	3.0%	1.7%	3.7%	-2.1%
1992	3.0%	0.2%	2.9%	2.2%	4.1%	-1.9%
**1993	3.1%	0.2%	2.9%	2.1%	4.1%	-2.0%
**1993 US numbers are latest 5-year average						

This scenario arbitrarily increases the economic stock adjustment factors by 0.1. Christensen Associates used an economic stock adjustment factor to adjust the gross stock for the age distribution of the assets, based on U.S. Bureau of Economic Analysis (BEA) reports. To assist the FCC in determining the sensitivity of this parameter, Christensen Associates also performed an analysis by reducing the economic stock adjustment factor by 0.1. However, arbitrarily changing the economic stock adjustment factor results in an incorrect TFP number.
(FOOTNOTE TO SCENARIO 2(a) CONTINUED ON NEXT PAGE)

FOOTNOTE TO SCENARIO 2(a) – CONTINUED

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

PARAMETER VALUES	QUESTION 2(a)*
COST OF CAPITAL	Study Values
DEPRECIATION	Study Values
STOCK ADJUSTMENT	2(a)*: Subtract 0.1

	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1984						
1985	0.3%	0.5%	-0.2%	0.5%	4.0%	-3.5%
1986	2.2%	1.0%	1.2%	1.6%	3.8%	-2.2%
1987	1.2%	0.1%	1.1%	1.5%	3.1%	-1.6%
1988	1.5%	0.6%	0.9%	-3.2%	4.4%	-7.6%
1989	1.5%	-0.3%	1.8%	-3.5%	4.1%	-7.6%
1990	4.4%	-0.3%	4.7%	11.4%	4.2%	7.2%
1991	0.9%	-1.1%	2.0%	1.5%	2.9%	-1.4%
1992	3.3%	1.9%	1.4%	4.3%	5.1%	-0.8%
*1993	2.4%			-3.1%		.
*US numbers not available for 1993						
Avg 84-92	1.9%	0.3%	1.6%	1.8%	4.0%	-2.2%
Avg 84-93	2.0%			1.2%		
Avg 85-93	2.2%			1.3%		

	FIVE-YEAR ROLLING AVERAGES					
5-year avg ending in	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1989	1.4%	0.4%	1.0%	-0.6%	3.9%	-4.5%
1990	2.2%	0.2%	1.9%	1.6%	3.9%	-2.3%
1991	1.9%	-0.2%	2.1%	1.5%	3.7%	-2.2%
1992	2.3%	0.2%	2.2%	2.1%	4.1%	-2.0%
**1993	2.5%	0.2%	2.3%	2.1%	4.1%	-2.0%
**1993 US numbers are latest 5-year average						

Scenario 2(a)* is a complement to scenario 2(a) and arbitrarily changes the economic stock adjustment factors by decreasing them by 0.1. The original scenario 2(a) requested an increase of 0.1. Christensen Associates used an economic stock adjustment factor to adjust the gross stock for the age distribution of the assets, based on U.S. Bureau of Economic Analysis (BEA) reports. To assist the FCC in determining the sensitivity of this parameter, Christensen Associates has both increased and decreased the economic stock adjustment factor by 0.1. However, arbitrarily changing the economic stock adjustment factor results in an incorrect TFP number. (FOOTNOTES CONTINUED ON NEXT PAGE)

FOOTNOTE TO SCENARIO 2(a)* – CONTINUED

5-year rolling averages for TFP are also calculated. The FCC also requested 5-year rolling averages of LEC total input prices and 5-year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

PARAMETER VALUES	QUESTION 2(b)
COST OF CAPITAL	Study Values
DEPRECIATION	Study Values
STOCK ADJUSTMENT	2(b): All=1.0

	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1984						
1985	3.3%	0.5%	2.8%	-0.9%	4.0%	-4.9%
1986	4.6%	1.0%	3.6%	0.6%	3.8%	-3.2%
1987	3.7%	0.1%	3.6%	2.0%	3.1%	-1.1%
1988	3.9%	0.6%	3.3%	-2.6%	4.4%	-7.0%
1989	3.5%	-0.3%	3.8%	-4.4%	4.1%	-8.5%
1990	5.6%	-0.3%	5.9%	12.5%	4.2%	8.3%
1991	2.2%	-1.1%	3.3%	1.2%	2.9%	-1.7%
1992	4.2%	1.9%	2.3%	4.7%	5.1%	-0.4%
*1993	3.3%			-4.6%		.
*US numbers not available for 1993						
Avg 84-92	3.9%	0.3%	3.6%	1.6%	4.0%	-2.3%
Avg 84-93	3.8%			0.9%		
Avg 85-93	3.9%			1.2%		

	FIVE-YEAR ROLLING AVERAGES					
5-year avg ending in	<u>LEC TFP Growth</u>	<u>BLS US MFP Growth</u>	<u>TFP Growth Differential</u>	<u>LEC Input Price Growth</u>	<u>US Economy Input Price Growth</u>	<u>Input Price Growth Differential</u>
1989	3.8%	0.4%	3.4%	-1.1%	3.9%	-4.9%
1990	4.3%	0.2%	4.0%	1.6%	3.9%	-2.3%
1991	3.8%	-0.2%	4.0%	1.7%	3.7%	-2.0%
1992	3.9%	0.2%	3.7%	2.3%	4.1%	-1.9%
**1993	3.8%	0.2%	3.6%	1.9%	4.1%	-2.3%
**1993 US numbers are latest 5-year average						

This scenario arbitrarily changes the economic stock adjustment factor to 1.0. Changing the economic stock adjustment factor assumes that there is no decline in the economic efficiency of an asset over its lifetime (the "light bulb" assumption). This is inconsistent with the capital computations made in our study. Using a value of 1.0 is an incorrect assumption, but Christensen Associates performed the analysis as requested by the FCC staff. Arbitrarily changing the economic stock adjustment factor results in an incorrect TFP number.

FOOTNOTE TO SCENARIO 2(b) CONTINUED ON NEXT PAGE

FOOTNOTE TO SCENARIO 2(b) – CONTINUED

5-year rolling averages for TFP are also calculated. The FCC also requested 5-year rolling averages of LEC total input prices and 5-year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.