9. Quality of Service

Introduction

This section summarizes various kinds of service quality data filed by certain incumbent local exchange telephone companies for calendar year 2002. The data track both the quality of service provided to retail customers (business and residential) and to access customers (interexchange carriers).

The Federal Communications Commission (FCC or Commission) does not impose service quality standards on communications common carriers. Rather, the Commission annually monitors data submitted by incumbent carriers that collectively serve about 90% of the nation's access lines and periodically publishes a report on quality of service trends.[1] The data contained in this section provide a summary of recent quality of service indicators including customer-initiated trouble reports and company responses. This section publishes information about company performance and statistics about company responsiveness to network failures and associated consumer complaints. We include, in the tables following the text, comparative data about various service parameters including installation, maintenance, switch downtime, and trunk blocking, along with associated customer perception data.

Background

At the end of 1983, anticipating AT&T's imminent divestiture of its local operating companies, the Commission directed the Common Carrier Bureau[2] to establish a monitoring program that would provide a basis for detecting adverse trends in network service quality. Throughout 1985, the Bureau modified the service quality reporting requirements to reduce unnecessary paperwork and to ensure that needed information would be provided in a more uniform format. The data were received semiannually, typically in March and August, and formed the basis for FCC summary reports published in June 1990 and July 1991.

With the implementation of price-cap regulation for certain local exchange carriers, the Commission made several major changes to the service quality monitoring program beginning with reports filed in 1991. First, the Commission expanded the class of companies filing reports to

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1 The last report was released in January 2003, which covered data for 2001. *See* Industry Analysis and Technology Division, Wireline Competition Bureau, Federal Communications Commission, *Quality of Service of the Local Operating Companies* (rel. Jan. 30, 2003). This report can be found on the Commission's website at www.fcc.gov/wcb/iatd/stats.html under the file name QUAL02.ZIP.

2 As the result of a reorganization in March 2002, Common Carrier Bureau functions described in this section are now performed by the Wireline Competition Bureau. In this section, references to the Common Carrier Bureau apply to activities prior to the above date.

include non-Bell carriers subject to price-cap regulation.[3] Second, the Commission included service quality reports in the Automated Reporting Management Information System (ARMIS).[4] Third, the Commission ordered significant changes to the kinds of data these carriers had to report.[5] Following these developments, the Commission released service quality summary reports in February 1993, March 1994, March 1996, September 1998, December 1999, December 2001, and January 2003.

In 1996, pursuant to requirements in the Telecommunications Act of 1996,[6] the Commission reduced the frequency of the filed data from quarterly to annual submissions.[7] In May 1997, relevant definitions were clarified further. These changes have been reflected starting with data covering the 1997 calendar year.

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3 *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Second Report and Order, 5 FCC Rcd 6786, 6827-31 (1990) (*LEC Price Cap Order*) (establishing the current service quality monitoring program and incorporating the service quality reports into the ARMIS program), Erratum, 5 FCC Rcd 7664 (1990), *modified on recon*, 6 FCC Rcd 2637 (1991), *aff'd sub nom.*, *Nat'l Rural Telecom Ass'n v. FCC*, 988 F.2d 174 (D.C. Cir. 1993). The incumbent local exchange carriers that are rate-of-return regulated are not subject to federal service quality reporting requirements.

4 *LEC Price Cap Order*, 5 FCC Rcd at 6827-30. The ARMIS database includes a variety of mechanized company financial and infrastructure reports in addition to the quality-of-service reports. Most data are available disaggregated to a study area or state level.

5 *Id*; *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Memorandum Opinion and Order, 6 FCC Rcd 2974 (1991) (*Service Quality Order*), *recon*, 6 FCC Rcd 7482 (1991). Previously the Common Carrier Bureau had collected data on five basic service quality measurements from the Bell Operating Companies. These were customer satisfaction levels, dial tone delay, transmission quality, on time service orders, and percentage of call blocking due to equipment failure.

6 *Telecommunications Act of 1996*, Pub. L. No. 104-104, 110 Stat. 56.

7 Orders implementing filing frequency and other reporting requirement changes associated with implementation of the Telecommunications Act of 1996 are as follows: *Implementation of the Telecommunications Act of 1996: Reform of Filing Requirements and Carrier Classifications*, CC Docket No. 96-193, Order and Notice of Proposed Rulemaking, 11 FCC Rcd 11716 (1996); *Revision of ARMIS Quarterly Report (FCC Report 43-01) et al.*, CC Docket No. 96-193, Order, 11 FCC Rcd 22508 (1996); *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Memorandum Opinion and Order, 12 FCC Rcd 8115 (1997); *Revision of ARMIS Annual Summary Report (FCC Report 43-01) et al.*, AAD No. 95-91, Order, 12 FCC Rcd 21831 (1997).

The Data

The source data used in preparing this section may be useful for further investigation and can be readily extracted from the ARMIS 43-05 and 43-06 tables on the online database maintained on the FCC website at <www.fcc.gov/wcb/eafs>. The data are also available from Qualex International, at (202) 863-2893. A number of prior data summary reports are available through the FCC's Reference Information Center (Courtyard Level) at 445 12th Street, SW, Washington, D.C. 20554.

The data presented in this section summarize the most recent ARMIS 43-05 and 43-06 carrier reports, setting forth data for calendar year 2002. The tables accompanying this section highlight many of the data elements now received by the Commission. Tables include data from each major holding company of the regional Bell companies, along with GTE which is now part of Verizon, and Sprint.[8]

The data items summarized in the tables are based on information aggregated by the companies on a study area or state basis as well as a fairly extensive amount of raw data about switching outages, including outage durations and number of lines affected. A number of useful measures were calculated from these raw data records such as outage line-minutes per access line and average outage duration.

The data summarized in the tables of this section contain sums, or weighted averages, of data reported at the state or study area level of aggregation. Such data are useful in assessing overall trends. Where information is reported in terms of percentages or average time intervals, data presented in the tables are based on a composite of individual study area data that are calculated by weighting the percentage or time interval figures. For example, we weight the percent of commitments met by the corresponding number of orders provided in the filed data.[9]

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8 In February 1992, United Telecommunications Inc. became Sprint Corporation (Local Division); and in March 1993, Sprint Corporation acquired Centel Corporation. Bell Atlantic and NYNEX merged in August 1997, and then merged with GTE in 2000. Verizon Communications is shown separately for GTE, Verizon North (the former NYNEX companies), and Verizon South (the former Bell Atlantic Companies). SBC, Pacific Telesis and Ameritech are shown separately despite the merger of SBC and Pacific Telesis in April 1997 and SBC and Ameritech in October 1999.

9 Company composite data were typically recalculated on a consistent basis from study area data, particularly to assure that averages are calculated in a consistent manner. Although the companies have prepared their own company rollups, we have discovered various inconsistencies or inaccuracies in some of these company-prepared composites. We have therefore weighted data involving percentages or time intervals in order to arrive at the more consistent composite data shown in the tables and expect that the companies will want to review their procedures for preparing composites. Parameters used for weighting in this section were appropriate for the composite being calculated and were based on the raw data filed by the carriers but are not necessarily shown in the tables. For example, we

The key items contained in the tables are summarized below. Installation, maintenance and customer complaint data are shown in Table 9.1 and switch downtime and trunk servicing data are shown in Table 9.2. Installation and maintenance data are presented separately for services provided to end users and for interexchange carrier access facilities. Outage data categorized by cause are shown in Table 9.3. Customer perception data are contained in Table 9.4 and the associated survey sample sizes are contained in Table 9.5. The tables cover data for 2002. This section displays a number of data elements that have remained roughly comparable over the past few years. More detailed information on the raw data from which this section has been developed is contained on the Commission's website for the ARMIS database noted above and in the report noted in footnote 2. In addition, complete data descriptions are available in several Commission Orders. [10]

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calculate composite installation interval data by summing the individual study area results multiplied by the number of installation orders reported for each study area and then dividing the result by the total number of orders.

10 Orders implementing filing frequency and other reporting requirement changes associated with implementation of the Telecommunications Act of 1996 are as follows: *Implementation of the Telecommunications Act of 1996: Reform of Filing Requirements and Carrier Classifications*, Order and Notice of Proposed Rulemaking, 11 FCC Rcd 11716 (1996); *Revision of ARMIS Quarterly Report (FCC Report 43-01) et al.*, Order, 11 FCC Rcd 22508 (1996); *Policy and Rules Concerning Rates for Dominant Carriers*, Memorandum Opinion and Order, 12 FCC Rcd 8115 (1997); *Revision of ARMIS Annual Summary Report (FCC Report 43-01) et al.*, Order, 12 FCC Rcd 21831 (1997).

Table 9.1
Installation, Maintenance, & Customer Complaints
Company Comparison - 2002

Company	BellSouth	Qwest	SBC Ameritech	SBC Pacific	SBC Southwestern	Verizon North	Verizon South	Verizon GTE	Sprint
ACCESS SERVICES PROVIDED TO INTEREXCHANGE CARRIERS – SWITCHED ACCESS									
Percent Installation Commitments Met	100 0	98 5	85 2	90 5	85 1	98 7	98 7	91 2	93 8
Average Installation Interval (days)	19 1	12 7	43 3	28 3	31 7	29 7	23 0	25 5	16 5
Average Repair Interval (hours)	0 7	1 7	22 3	16 6	13 5	2 6	3 2	10 4	2 8
ACCESS SERVICES PROVIDED TO INTEREXCHANGE CARRIERS -- SPECIAL ACCESS									
Percent Installation Commitments Met	99 9	96 9	98 1	85 3	89 6	88 4	94 6	90 5	92 9
Average Installation Interval (days)	13 1	10 8	15 2	28 7	12 7	25 2	17 1	20 5	9 9
Average Repair Interval (hours)	3 0	2 4	4 0	3 4	3 2	8 1	3 3	14 6	4 7
LOCAL SERVICES PROVIDED TO RESIDENTIAL AND BUSINESS CUSTOMERS									
Percent Installation Commitments Met	93 0	99 4	99 0	99 5	98 6	98 6	98 5	98 7	97 8
Residence	97 1	99 5	99 1	99 6	98 7	98 6	98 7	98 9	98 2
Business	88 9	98 6	98 3	98 9	98 0	97 8	96 7	96 8	94 9
Average Installation Interval (days)	1 3	0 6	2 1	1 4	1 6	1 1	1 3	0 6	1 6
Residence	1 0	0 5	2 1	1 2	1 6	1 0	1 2	0 4	1 5
Business	1 6	1 4	2 6	2 7	1 8	1 8	2 4	1 7	2 5
Average Out of Service Repair Interval (hours)	18 4	13 6	18 6	23 5	19 8	23 8	21 6	14 3	15 1
Residence	20 0	13 6	18 9	25 9	21 0	25 1	22 9	15 4	15 2
Business	10 6	13 5	17 1	12 1	13 2	18 9	15 2	9 2	13 7
Initial Trouble Reports per Thousand Lines	285 0	111 4	165 7	129 0	186 8	175 1	135 8	143 9	165 6
Total MSA	267 5	110 5	169 1	126 8	173 3	182 1	132 7	138 2	148 0
Total Non MSA	380 7	115 1	128 4	179 9	254 4	133 1	172 3	165 1	200 6
Total Residence	326 7	134 1	214 6	168 8	258 8	245 0	178 5	165 2	202 3
Total Business	174 8	61 2	75 1	58 9	71 9	81 8	65 1	95 0	69 0
Troubles Found per Thousand Lines	161 3	76 2	111 9	106.2	130 2	125 9	102 9	122 1	93.0
Repeat Troubles as a Pct of Trouble Reports	19 8%	21 9%	28 3%	13 3%	15 9%	20 1%	18 9%	12 4%	19 6%
Res. Complaints per Mill Res Access Lines	203 8	169 1	324 4	20 4	26 8	166 9	312 5	86 7	110 3
Bus Complaints per Mill Bus Access Lines	59 3	129 3	102 4	4 6	7 1	47 9	58 6	33 8	40 2

Please refer to text for notes and data qualifications

Table 9.2
Switch Downtime & Trunk Blocking
Company Comparison - 2002

Company	BellSouth	Qwest	SBC Ameritech	SBC Pacific	SBC Southwestern	Verizon North	Verizon South	Verizon GTE	Sprint
Total Access Lines in Thousands	22,955	15,682	19,151	17,248	15,294	17,442	21,368	16,894	7,953
Total Trunk Groups	3,577	3,378	1,111	1,581	802	826	1,005	1,669	7,436
Total Switches	1,637	1,337	1,455	778	1,652	1,279	1,344	3,130	1,563
Switches with Downtime									
Number of Switches	68	252	201	32	71	34	28	40	136
As a Percentage of Total Switches	4 2%	18 8%	13 8%	4 1%	4 3%	2 7%	2 1%	1 3%	8 7%
Average Switch Downtime in Seconds per Switch									
For All Events	97 8	95 0	90 5	4 2	49 0	36 3	31 2	117 2	460 8
For Unscheduled Events Over 2 Minutes	88 0	78 0	29 5	3 2	44 7	33 6	30 3	118 9	381 1
For Unscheduled Downtime More Than 2 Minutes									
Number of Occurrences or Events	33	42	25	8	11	26	13	42	71
Events per Hundred Switches	2 0	3 1	1 7	1 0	0 7	2 0	1 0	1 3	4 5
Events per Million Access Lines	1 44	2 68	1 31	0 46	0 72	1 49	0 61	2 49	8 93
Average Outage Duration in Minutes	72 7	41 4	28 6	5 1	111 8	27 6	52 2	147 7	139 8
Average Lines Affected per Event in Thousands	21 8	6 3	28 1	37 5	23 8	23 7	22 2	6 9	12 3
Outage Line-Minutes per Event in Thousands	766 9	218 7	644 9	171 9	2,900 1	483 1	163 6	859 8	1,896 0
Outage Line-Minutes per 1,000 Access Lines	1,102 5	585 7	841 9	79 7	2,085 8	720 1	99 5	2,137 6	16,925 4
For Scheduled Downtime More Than 2 Minutes									
Number of Occurrences or Events	4	51	58	0	7	3	3	1	64
Events per Hundred Switches	0 2	3 8	4 0	0 0	0 4	0 2	0 2	0 0	4 1
Events per Million Access Lines	0 17	3 25	3 03	0 00	0 46	0 17	0 14	0 06	8 05
Average Outage Duration in Minutes	5 1	4 0	24 8	NA	14 3	10 7	2 3	NA	32 4
Avg Lines Affected per Event in Thousands	8 5	11 2	18 5	NA	52 3	20 8	23 6	NA	9.9
Outage Line-Minutes per Event in Thousands	28 1	53 3	539 9	NA	243 6	203 9	55 6	NA	364.7
Outage Line-Minutes per 1,000 Access Lines	4 9	173 4	1,635 2	0 0	111 5	35 1	7 8	0 4	2,934 9
% Common Trunk Grps Exceeding Blocking Objectives	2 60%	2 19%	8 37%	1 45%	0 25%	3 63%	8 26%	0 06%	0 15%

NA. Not available

Please refer to text for notes and data qualifications

Table 9.3
Switch Downtime Causes
Company Comparison - 2002

Company	BellSouth	Qwest	SBC Ameritech	SBC Pacific	SBC Southwestern	Verizon North	Verizon South	Verizon GTE	Sprint
Total Number of Outages									
1 Scheduled	4	51	58	0	7	3	3	1	64
2 Procedural Errors -- Telco (Inst /Maint)	0	0	0	0	4	3	1	4	20
3 Procedural Errors -- Telco (Other)	5	7	1	1	0	0	0	9	0
4 Procedural Errors -- System Vendors	4	4	1	0	1	2	0	1	1
5 Procedural Errors -- Other Vendors	0	1	0	0	2	1	2	2	1
6 Software Design	9	2	13	0	3	7	2	1	3
7 Hardware Design	1	0	9	0	0	0	0	0	0
8 Hardware Failure	8	25	1	6	0	12	5	15	13
9 Natural Causes	1	0	0	0	1	1	1	4	3
10 Traffic Overload	0	0	0	0	0	0	0	0	0
11 Environmental	0	0	0	0	0	0	0	1	2
12 External Power Failure	4	3	0	0	0	0	2	5	9
13 Massive Line Outage	0	0	0	0	0	0	0	0	3
14 Remote	0	0	0	0	0	0	0	0	9
15 Other/Unknown	1	0	0	1	0	0	0	0	7
Total Outage Line-Minutes per Thousand Access Lines									
1 Scheduled	4 9	173 4	1,635 2	0 0	111 5	35 1	7 8	0 4	2,934 9
2 Procedural Errors -- Telco (Inst /Maint)	0 0	0 0	0 0	0 0	1,661 7	186 1	8 7	84 7	224 3
3 Procedural Errors -- Telco (Other)	25 0	146 5	7 7	10 0	0 0	0 0	0 0	373 3	0 0
4 Procedural Errors -- System Vendors	211 0	28 3	3 3	0 0	7 0	24 3	0 0	94 9	264 7
5 Procedural Errors -- Other Vendors	0 0	84 6	0 0	0 0	390 1	0 5	0 5	109 9	9 6
6. Software Design	718 2	3 0	747 8	0 0	24 6	394 4	23 4	0 2	2,061 1
7 Hardware Design	3 7	0 0	76 5	0 0	0 0	0 0	0 0	0 0	0 0
8 Hardware Failure	78 4	180 7	6 7	47 9	0 0	114 7	17 7	674 6	2,446 6
9 Natural Causes	5 5	0 0	0 0	0 0	2 5	0 1	21 6	128 4	7,190 4
10. Traffic Overload	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
11. Environmental	0 0	0 0	0 0	0 0	0 0	0 0	0 0	561 7	60 6
12. External Power Failure	45 4	142 5	0 0	0 0	0 0	0 0	27 6	110 0	1,941 4
13 Massive Line Outage	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	1,725 9
14 Remote	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	972 7
15 Other/Unknown	15 3	0 0	0 0	21.9	0 0	0 0	0 0	0 0	28 2

Please refer to text for notes and data qualifications

Table 9.4
Customer Perception Surveys - Percent of Customers Dissatisfied
Company Comparision - 2002

Company	BellSouth	Qwest	SBC Ameritech	SBC Pacific	SBC Southwestern	Verizon North	Verizon South	Verizon GTE	Sprint
Installations									
Residential	10 25	7 17	10 67	6 35	8 12	5 26	5 07	4 36	NA
Small Business	9 58	15 93	11 85	6 30	8 87	9 20	8 16	7 69	NA
Large Business	7 33	NA	10 69	5 55	6 44	1 84	2 73	4 79	NA
Repairs.									
Residential	14.60	9 30	14 57	7 25	9 63	15 96	14 62	12.36	NA
Small Business	8.49	11 82	12 81	5 61	6 76	11 89	9.53	9 05	NA
Large Business	6 67	NA	11 67	4 08	5 90	4 39	2 98	4 42	NA
Business Office·									
Residential	12 26	3 63	13.23	5.96	8 88	6 78	5 71	6 20	NA
Small Business	14.26	7 09	12.48	5 79	7.67	7 67	8 73	9.04	NA
Large Business	9 00	NA	10 99	5.88	6.67	2 21	6.86	5 73	NA

NA: Not available

Please refer to text for notes and data qualifications

Table 9.5
Customer Perception Surveys - Sample Sizes
Company Comparision - 2002

Company	BellSouth	Qwest	SBC Ameritech	SBC Pacific	SBC Southwestern	Verizon North	Verizon South	Verizon GTE	Sprint
Installations.									
Residential	27,226	7,086	10,693	10,742	7,899	20,440	18,597	22,434	NA
Small Business	31,351	3,542	10,477	10,515	7,240	18,590	18,385	18,332	NA
Large Business	8,496	NA	3,355	3,206	2,660	837	1,104	313	NA
Repairs									
Residential	27,948	2,267	10,722	12,615	10,819	20,349	18,550	18,523	NA
Small Business	34,260	513	10,745	10,358	10,719	20,323	18,116	22,439	NA
Large Business	7,929	NA	3,710	3,063	2,726	780	925	294	NA
Business Office.									
Residential	41,753	7,086	21,409	23,834	38,342	10,851	13,622	14,462	NA
Small Business	11,106	3,542	20,787	21,294	4,823	5,308	5,683	5,500	NA
Large Business	400	NA	3,454	4,681	2,639	660	845	227	NA

NA: Not available

Please refer to text for notes and data qualifications

10. Infrastructure

The infrastructure information contained in this section is based upon data collected by the FCC as part of its price-cap monitoring procedures.[1] This summary is intended to highlight changes in the use of technology in the local telephone company plant. The data (ARMIS 43-07 reports[2]) upon which this infrastructure summary is based are due April 1 for the previous calendar year. This infrastructure report includes data through 2002.[3] The most recent data were due April 1, 2003. No revisions have been filed in time for inclusion in this summary.

Background

The data items presented here summarize ARMIS Report 43-07, which is filed by local exchange carriers subject to mandatory price-cap regulation. The information contained in this report is for the years 1992 through 2002. Since last year, recent changes to our infrastructure data collection process are reflected in this year's data. A number of items have been eliminated from reporting requirements and no longer will be addressed in this report.[4] Most of the eliminated items relate to switching technologies that have become obsolete or reflect virtually complete deployment of capabilities such as touch-tone capability. New data are being collected

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1 *Policy and Rules Concerning Rates For Dominant Carriers*, CC Docket No. 87-313, Second Report and Order, 5 FCC Rcd 6786 (1990) (*LEC Price Cap Order*), Erratum, 5 FCC Rcd 7664 (Com. Car. Bur. 1990); *Policy and Rules Concerning Rates For Dominant Carriers*, CC Docket No. 87-313, Memorandum Opinion and Order, 8 FCC Rcd 7474 (Com. Car. Bur. 1993) (*Service Quality Modifications Order*).

2 ARMIS, an acronym for Automated Reporting Management Information System, is a publicly available repository of financial, plant, demand, and quality-of-service data. Additional infrastructure data are contained in the ARMIS 43-08 report. See *Statistics of Communications Common Carriers*, published annually by the Wireline Competition Bureau's Industry Analysis and Technology Division for a compilation of ARMIS 43-08 infrastructure data.

3 See *Infrastructure of the Local Operating Companies Aggregated to the Holding Company Level*, released April 24, 1995 for data for the years 1989 and 1990. Some of the data for those early years are not a part of this summary and may contain discrepancies that make the early data inconsistent with that of later years. Reports containing data for the early years can be found in the infrastructure section of the FCC-State Link Internet site at www.fcc.gov/wcb/stats under the file names INFRA99.ZIP, INFRA98.ZIP, INFRA95.ZIP, and INFRA93.ZIP. More recent reports can be found in Section 10 of earlier versions of this report on the same web page under the section covering the Commission's Federal-State Joint Board Monitoring Reports.

4 Historical information for the entries that are no longer reported can be found in the 2002 *Monitoring Report*.

Although the overall level of growth in fiber has been high, its use in the local loop at present appears to be relatively small. The reporting companies included in this report had an installed base of about 215 million copper-pair mainframe terminations in their central offices for local loop use in 2002. In comparison, about 3 million fiber loop central office terminations had been installed by end-of-year 2002. The data show that the number of these terminations actually declined by about 8.6% during 2002 as compared to an increase of over 13% in 2001. In 2002 more modest growth in DS-3 terminations on fiber facilities is evident as compared to prior years. Over the longer term, fiber and hybrid copper/fiber systems will likely become increasingly important in the local loop as the number of high-quality copper pairs available to support higher data rate digital services declines.

As noted earlier, the data presented in this report do not include data associated with hybrid fiber/copper interfaces including information on offerings of xDSL services for which the companies requested proprietary treatment.[11] Nonetheless the number of ISDN capable lines can be used as an upper bound for potential broadband availability over copper loops, since copper loop characteristics necessary to support ISDN services are also required for newer xDSL services.[12] Readers interested in more disaggregated information may wish to examine data at a more localized level than presented here.[13]

(authored by J. Kraushaar, Industry Analysis and Technology Division, Wireline Competition Bureau, Federal Communications Commission).

11 xDSL (Digital Subscriber Loop) services that are now available offer broadband digital capability using special terminal equipment that enhances the capability of existing copper access lines.

12 Table 10.1 includes the number of switch terminations that are available for ISDN and ISDN capable lines. Table 10.2 includes the number of copper loops that are capable of supporting ISDN.

13 Individual study-area data are also available to address more localized issues. This information is available from the ARMIS web page at <www.fcc.gov/wcb/eafs/>.

ARMIS data currently collected only cover circuit switches that provide a dedicated path through the network for the duration of a call, not routers or switches that are used to handle internet traffic or in connection with frame relay and ATM services that are specifically designed to handle data packets.[9] Almost all of the major local exchange carrier switches are digital. About one-third of these are ISDN capable. However, the rate at which new ISDN switching capability is being added to the networks has slowed considerably, in recent years with 162 additional ISDN capable switches being reported in 2002. Even so, in 2002, the reported number of equipped ISDN Primary Rate Interfaces increased by 1.4 percent, from 551,102 to 558,763. ISDN basic rate services also grew, in spite of the use of xDSL technologies, with about 84,495 reported new Basic Rate Interfaces equipped or working in 2002.

A number of transmission elements are included in Table 10.2. Definitions for these elements can be found on the Commissions ARMIS website noted above. These illustrate the rapid development of fiber capacity in terms of terminations, sheath kilometers, and links. The number of sheath kilometers of fiber more than doubled over the decade 1992-2002, with about 25,834 new fiber sheath kilometers being reported in 2002. During the same period, the number of sheath kilometers of copper remained steady at somewhat over 5 million, and other sheath data, in relative terms, were not significant.

Table 10.2 also highlights the relative magnitude of equipped and working channels. While copper channels have declined in 2002, fiber equipped channels have increased by about 10.7 percent, and fiber working channels have increased by about 6.6 percent. Total interoffice circuit links have only increased very slightly over last year. Although circuits connecting local central offices could typically be provided on only two fibers, the economics of fiber deployment have resulted in deployments of typical fiber cables containing more than 40 fibers. This suggests that there is a significant amount of fiber capacity currently unused in the *interoffice* transmission plant.[10]

Jurisdictional Separations Reform and Referral to the Federal-State Joint Board; and Local Competition and Broadband Reporting, CC Docket Nos. 00-199, 99-301, 97-212, 80-286, Report and Order in CC Docket Nos. 00-199, 97-212, and 80-286, Further Notice of Proposed Rulemaking in CC Docket Nos. 00-199, 99-301, and 80-286, 16 FCC Rcd 19911 (2001), *recon pending* (*Phase 2 Report and Order*).

9 Remote switches as defined in this report only cover those switches capable of functioning if the host switch fails.

10 A large portion of the cost of fiber deployment is associated with labor and installation rather than with the cable itself. Thus, the incremental cost of installing a larger fiber cable is typically relatively small. This suggests that the sheath-kilometer parameter shown in the attached tables may be a better measure of fiber coverage than fiber kilometers. In general, care should be exercised in interpreting aggregate fiber data when determining, for example, whether fiber is concentrated in certain parts of a company's service area with relatively little fiber elsewhere. See *Fiber Deployment Update - End of Year 1998*, released Sept. 9, 1999: <www.fcc.gov/wcb/iatd/stats.html>: FIBER98.ZIP

Table 10.1
Switching Data
BellSouth Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Local Switches	1,664	1,661	1,658	1,647	1,650	1,654	1,653	1,649	1,644	1,642	1,637
Tandems	66	70	70	71	70	70	71	71	73	77	77
Hosts	272	269	280	289	297	317	307	306	297	304	305
Remotes (Stand Alone Only)	703	714	732	742	747	766	765	765	776	819	829
Total Switches	1,678	1,680	1,677	1,668	1,670	1,674	1,673	1,668	1,665	1,665	1,664
Analog Stored Program Control	283	236	182	158	130	106	100	83	69	54	44
Digital Stored Program Control	1,395	1,444	1,495	1,510	1,540	1,568	1,573	1,585	1,596	1,611	1,620
Total Number Access Lines in Service (000)	18,607	19,233	20,141	21,064	22,019	23,080	23,909	24,458	24,558	23,756	22,955
Analog Stored Program Control Lines Served	7,173	5,929	4,837	4,455	4,020	3,746	3,536	2,972	2,362	1,729	1,309
Digital Stored Program Control Lines Served	11,434	13,304	15,304	16,609	17,999	19,334	20,373	21,486	22,197	22,027	21,646
Total Switches Equipped w/SS7-394 (InterLATA) Svc	966	1,447	1,627	1,629	1,652	1,674	1,673	1,668	1,665	1,665	1,664
Total Switches Equipped with ISDN	224	324	407	467	518	584	596	645	691	678	697
Lines with Access to ISDN (000)	4,934	7,606	9,708	10,988	12,948	14,894	15,980	17,413	18,396	17,660	17,457
Basic Rate ISDN (BRI) Interfaces Equipped	50,774	65,607	76,348	80,641	122,043	167,512	183,458	202,391	223,294	228,898	230,066
Primary Rate ISDN (PRI) Interfaces Equipped	559	1,814	3,534	4,803	9,154	21,389	33,564	51,669	72,347	85,983	81,328

Source ARMIS Report 43-07

Table 10.1
Switching Data
Total - All Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Local Switches	16,506	16,650	16,017	16,157	16,267	16,186	16,117	16,261	14,702	14,700	13,906
Tandems	477	475	456	470	484	481	493	492	498	516	520
Hosts	2,217	2,366	2,309	2,382	2,432	2,515	2,471	2,461	2,322	2,278	2,241
Remotes (Stand Alone Only)	5,689	6,349	6,706	7,140	7,098	7,164	7,977	8,103	7,335	7,356	7,538
Total Switches	16,701	16,858	16,195	16,342	16,486	16,448	16,392	16,516	14,953	14,972	14,208
Analog Stored Program Control	2,007	1,632	1,179	1,002	735	558	431	314	200	139	107
Digital Stored Program Control	12,739	13,733	13,987	14,601	15,356	15,722	15,961	16,202	14,753	14,833	14,101
Total Number Access Lines in Service (000)	125,776	129,642	133,409	138,907	143,239	150,043	155,530	159,364	158,107	153,614	146,034
Analog Stored Program Control Lines Served	49,989	42,746	33,699	29,409	24,803	21,416	16,688	11,713	7,192	4,810	3,283
Digital Stored Program Control Lines Served	73,815	85,549	98,799	108,903	118,149	128,470	138,842	147,651	150,915	148,804	142,752
Total Switches Equipped w/SS7-394 (InterLATA) Svc	5,745	8,037	10,358	11,890	13,171	13,879	15,148	15,994	14,681	14,817	14,122
Total Switches Equipped with ISDN	1,437	2,146	2,670	3,258	3,852	4,681	5,392	5,735	5,340	5,364	5,526
Lines with Access to ISDN (000)	29,775	41,970	61,549	77,523	95,113	106,575	121,408	127,357	131,003	127,382	122,420
Basic Rate ISDN (BRI) Interfaces Equipped	491,430	591,561	801,518	1,039,456	1,507,551	1,797,254	2,491,509	2,720,871	2,775,102	3,059,482	3,143,977
Primary Rate ISDN (PRI) Interfaces Equipped	3,147	5,816	15,526	32,580	67,885	136,233	234,515	334,910	429,295	551,102	558,763

Source: ARMIS Report 43-07

Table 10.1
Switching Data
SBC Ameritech Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Local Switches	1,433	1,422	1,413	1,415	1,410	1,435	1,419	1,432	1,447	1,451	1,455
Tandems	46	47	47	46	46	47	51	52	53	55	63
Hosts	178	230	236	238	236	243	236	234	234	235	236
Remotes (Stand Alone Only)	666	684	717	731	743	769	764	775	790	789	790
Total Switches	1,473	1,469	1,460	1,461	1,456	1,482	1,470	1,485	1,500	1,506	1,518
Analog Stored Program Control	318	224	119	97	71	58	46	39	37	34	24
Digital Stored Program Control	1,155	1,245	1,341	1,364	1,385	1,424	1,424	1,446	1,463	1,472	1,494
Total Number Access Lines in Service (000)	16,887	17,500	18,122	19,310	19,553	20,335	20,790	21,036	20,898	20,074	19,151
Analog Stored Program Control Lines Served	7,898	5,862	3,845	3,727	3,228	2,793	2,193	1,811	1,730	1,491	927
Digital Stored Program Control Lines Served	8,988	11,638	14,278	15,583	16,324	17,541	18,597	19,225	19,168	18,583	18,224
Total Switches Equipped w/SS7-394 (InterLATA) Svc	646	1,001	1,254	1,400	1,438	1,463	1,451	1,476	1,492	1,496	1,504
Total Switches Equipped with ISDN	181	387	444	489	601	695	784	816	822	844	933
Lines with Access to ISDN (000)	3,839	8,056	10,259	12,860	13,802	15,464	16,804	17,472	17,388	16,814	16,810
Basic Rate ISDN (BRI) Interfaces Equipped	56,352	67,415	87,862	97,550	226,355	180,280	220,867	259,312	271,468	283,600	290,367
Primary Rate ISDN (PRI) Interfaces Equipped	728	707	1,505	1,677	4,247	14,569	24,800	38,037	53,926	70,542	75,184

Source: ARMIS Report 43-07

Table 10.1
Switching Data
Qwest Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Local Switches	1,834	1,841	1,738	1,641	1,521	1,441	1,446	1,428	1,400	1,354	1,337
Tandems	51	51	51	51	51	51	51	51	53	51	56
Hosts	195	222	232	238	248	249	253	251	245	252	226
Remotes (Stand Alone Only)	692	880	984	961	852	781	786	752	733	680	651
Total Switches	1,852	1,858	1,752	1,654	1,534	1,492	1,458	1,441	1,414	1,363	1,351
Analog Stored Program Control	294	261	213	188	146	113	95	71	20	1	1
Digital Stored Program Control	1,168	1,387	1,519	1,465	1,387	1,379	1,363	1,370	1,394	1,362	1,350
Total Number Access Lines in Service (000)	13,268	13,710	14,309	14,817	15,405	16,132	16,859	17,449	17,626	17,070	15,682
Analog Stored Program Control Lines Served	6,508	6,257	5,303	4,706	4,245	4,228	3,574	2,501	636	30	28
Digital Stored Program Control Lines Served	6,364	7,292	8,988	10,110	11,159	11,905	13,286	14,948	16,991	17,040	15,654
Total Switches Equipped w/SS7-394 (InterLATA) Svc	470	620	819	1,116	1,143	1,305	1,346	1,350	1,340	1,311	1,311
Total Switches Equipped with ISDN	163	213	240	262	327	541	557	583	623	603	587
Lines with Access to ISDN (000)	4,757	3,982	5,045	6,192	9,668	10,264	11,189	12,522	14,573	14,419	13,153
Basic Rate ISDN (BRI) Interfaces Equipped	92,613	108,775	120,058	126,530	146,570	162,953	165,733	167,623	176,696	174,079	199,302
Primary Rate ISDN (PRI) Interfaces Equipped	396	674	742	2,315	2,734	4,329	4,867	6,112	7,822	11,046	61,993

Source ARMIS Report 43-07.

Table 10.1
Switching Data
SBC Southwestern Bell Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Local Switches	1,392	1,437	1,511	1,644	1,670	1,690	1,644	1,658	1,663	1,660	1,652
Tandems	67	64	60	60	60	60	67	56	69	70	70
Hosts	191	230	233	245	241	267	230	228	229	230	244
Remotes (Stand Alone Only)	488	672	779	935	1,077	1,077	1,158	1,163	1,152	1,150	1,150
Total Switches	1,425	1,469	1,539	1,679	1,730	1,750	1,711	1,727	1,715	1,716	1,722
Analog Stored Program Control	348	308	264	252	162	136	115	88	67	46	34
Digital Stored Program Control	855	1,078	1,202	1,369	1,568	1,614	1,596	1,639	1,648	1,670	1,688
Total Number Access Lines in Service (000)	12,693	13,180	13,611	14,095	14,104	15,306	15,872	16,287	16,411	15,842	15,294
Analog Stored Program Control Lines Served	7,455	7,078	6,608	6,531	5,657	5,055	4,119	3,107	2,246	1,448	963
Digital Stored Program Control Lines Served	4,924	6,000	6,907	7,502	8,447	10,251	11,753	13,180	14,165	14,394	14,331
Total Switches Equipped w/SS7-394 (InterLATA) Svc	607	723	1,263	1,466	1,597	1,724	1,707	1,724	1,713	1,713	1,722
Total Switches Equipped with ISDN	92	92	123	303	331	331	360	428	441	461	472
Lines with Access to ISDN (000)	1,964	1,476	1,933	8,826	9,440	10,577	13,361	12,158	12,169	12,056	11,241
Basic Rate ISDN (BRI) Interfaces Equipped	88,960	88,960	57,041	108,784	104,604	185,018	225,427	267,190	281,459	310,326	308,501
Primary Rate ISDN (PRI) Interfaces Equipped	380	410	1,238	5,084	6,150	15,434	31,570	46,533	59,513	68,236	68,793

Source ARMIS Report 43-07

Table 10.1
Switching Data
SBC Pacific Telesis Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Local Switches	853	846	837	840	833	810	801	799	778	781	779
Tandems	20	20	20	20	20	21	24	24	24	31	31
Hosts	103	111	121	117	114	135	121	116	189	114	114
Remotes (Stand Alone Only)	253	302	320	316	310	364	361	350	361	360	358
Total Switches	873	866	857	860	853	830	824	822	802	812	810
Analog Stored Program Control	218	176	109	87	72	49	38	17	0	0	0
Digital Stored Program Control	652	687	746	772	781	781	786	805	802	812	810
Total Number Access Lines in Service (000)	14,661	14,971	15,417	16,021	16,460	17,155	18,158	18,285	18,236	17,788	17,248
Analog Stored Program Control Lines Served	8,128	7,036	5,029	4,036	3,354	2,422	1,825	754	0	0	0
Digital Stored Program Control Lines Served	6,532	7,934	10,387	11,985	13,106	14,733	16,333	17,531	18,236	17,788	17,248
Total Switches Equipped w/SS7-394 (InterLATA) Svc	374	522	764	772	794	791	803	796	778	812	810
Total Switches Equipped with ISDN	150	229	347	417	473	531	551	574	574	562	560
Lines with Access to ISDN (000)	2,905	5,349	8,494	10,291	11,895	13,632	15,134	16,529	17,589	16,966	16,427
Basic Rate ISDN (BRI) Interfaces Equipped	47,661	65,683	115,146	171,305	304,182	314,003	468,493	489,369	421,744	630,816	615,934
Primary Rate ISDN (PRI) Interfaces Equipped	308	357	708	3,491	13,448	20,125	31,345	47,794	49,712	94,742	54,902

Source: ARMIS Report 43-07

Table 10.1
Switching Data
Verizon - GTE Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Local Switches	6,597	6,731	6,155	6,274	6,499	6,453	6,538	6,659	5,136	5,190	4,423
Tandems	162	158	143	157	166	165	162	164	150	151	136
Hosts	924	955	849	884	929	939	955	945	742	761	652
Remotes (Stand Alone Only)	1,558	1,732	1,767	2,031	1,925	1,960	2,738	2,861	2,088	2,134	2,100
Total Switches	6,632	6,769	6,172	6,291	6,520	6,483	6,604	6,691	5,174	5,235	4,462
Analog Stored Program Control	83	78	46	26	17	10	0	0	0	0	0
Digital Stored Program Control	5,209	5,494	5,192	5,586	6,109	6,305	6,604	6,691	5,174	5,235	4,462
Total Number Access Lines in Service (000)	15,781	16,274	16,064	16,641	17,393	18,321	19,105	20,015	18,709	18,503	16,894
Analog Stored Program Control Lines Served	1,030	834	508	378	242	197	0	0	0	0	0
Digital Stored Program Control Lines Served	13,491	14,357	14,759	15,731	16,866	17,966	19,105	20,015	18,709	18,503	16,894
Total Switches Equipped w/SS7-394 (InterLATA) Svc	1,499	2,034	2,250	2,930	3,897	4,215	5,527	6,309	5,021	5,156	4,429
Total Switches Equipped with ISDN	218	272	270	390	523	779	1,246	1,385	884	913	949
Lines with Access to ISDN (000)	1,399	2,095	5,003	6,249	9,678	10,619	14,574	14,926	14,064	13,830	13,320
Basic Rate ISDN (BRI) Interfaces Equipped	22,763	30,741	63,012	91,326	98,145	126,946	139,471	167,964	173,507	173,220	169,320
Primary Rate ISDN (PRI) Interfaces Equipped	475	896	1,406	2,703	7,377	16,465	36,386	47,588	62,652	70,524	69,281

Source: ARMIS Report 43-07

Table 10.1
Switching Data
Verizon - Bell Atlantic Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Local Switches	2,733	2,712	2,705	2,696	2,684	2,703	2,616	2,636	2,634	2,622	2,623
Tandems	65	65	65	65	71	67	67	74	76	81	87
Hosts	354	349	358	371	367	365	369	381	386	382	464
Remotes (Stand Alone Only)	1,329	1,365	1,407	1,424	1,444	1,447	1,405	1,437	1,435	1,424	1,660
Total Switches	2,768	2,747	2,738	2,729	2,723	2,737	2,652	2,682	2,683	2,675	2,681
Analog Stored Program Control	463	349	246	194	137	86	37	16	7	4	4
Digital Stored Program Control	2,305	2,398	2,492	2,535	2,586	2,651	2,615	2,666	2,676	2,671	2,677
Total Number Access Lines in Service (000)	33,879	34,774	35,745	36,959	38,305	39,714	40,838	41,833	41,669	40,582	38,810
Analog Stored Program Control Lines Served	11,797	9,750	7,569	5,576	4,057	2,975	1,442	568	218	112	55
Digital Stored Program Control Lines Served	22,082	25,024	28,176	31,383	34,248	36,739	39,396	41,266	41,451	40,469	38,754
Total Switches Equipped w/SS7-394 (InterLATA) Svc	1,183	1,690	2,381	2,577	2,650	2,707	2,641	2,671	2,672	2,664	2,682
Total Switches Equipped with ISDN	409	629	839	930	1,079	1,220	1,298	1,304	1,305	1,303	1,328
Lines with Access to ISDN (000)	9,977	13,406	21,107	22,117	27,682	31,125	34,367	36,336	36,825	35,637	34,012
Basic Rate ISDN (BRI) Interfaces Equipped	132,307	164,380	282,051	363,320	505,652	660,542	1,088,060	1,167,022	1,226,934	1,258,543	1,330,487
Primary Rate ISDN (PRI) Interfaces Equipped	301	958	6,393	12,507	24,775	43,922	71,983	97,177	123,323	150,029	147,282

Source. ARMIS Report 43-07

Table 10.2
Transmission System Data
BellSouth Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sheath Kilometers											
Total Sheath Kilometers	979,751	993,633	1,005,397	1,020,809	1,034,601	1,050,186	1,074,896	1,094,569	1,115,897	1,134,363	1,145,506
Copper	921,509	927,265	930,812	937,626	943,090	951,758	965,108	973,995	983,221	989,541	992,446
Fiber	56,692	65,100	73,370	82,012	90,093	96,852	105,335	116,507	129,209	141,356	149,609
Other	1,550	1,268	1,215	1,171	1,418	1,576	4,453	4,067	3,466	3,466	3,452
Interoffice Working Facilities											
Total Circuit Links	2,702,141	2,935,085	4,287,654	4,756,430	5,245,925	6,107,816	6,134,728	8,564,658	9,828,726	10,690,256	10,835,682
Loop Plant -- Central Office Terminations											
Total Equipped Channels	31,742,421	33,070,338	34,669,704	36,022,283	37,866,890	39,550,588	40,957,871	42,025,575	49,435,188	51,061,973	39,822,163
Copper	28,821,672	29,291,200	29,995,720	30,351,794	30,903,216	31,270,774	31,917,878	31,849,537	37,493,164	38,176,168	30,263,142
Fiber Digital Carrier	2,919,937	3,778,341	4,673,140	5,669,647	6,962,832	8,278,972	9,039,151	10,175,104	11,940,618	12,883,709	9,557,876
Other	812	798	842	842	842	842	842	934	1,406	2,096	1,145
Total Working Channels	20,196,488	21,275,558	23,284,636	24,682,894	26,230,400	27,921,162	29,836,968	30,422,706	33,655,481	34,114,639	25,039,974
Copper	17,874,950	18,288,532	19,283,574	19,871,262	20,318,019	20,708,890	21,233,672	21,237,643	22,044,514	21,597,814	17,250,216
Fiber Digital Carrier	2,321,451	2,986,937	4,000,986	4,811,550	5,912,292	7,212,190	8,603,214	9,184,935	11,610,551	12,516,193	7,789,007
Other	87	90	77	82	89	82	82	128	416	632	751
Other Transmission Facility Data											
Copper Pairs Term Main Frame (Loop Plant Only)	26,382,231	26,433,408	26,451,200	26,527,293	26,342,776	26,703,438	27,082,625	26,602,864	31,771,617	32,464,246	26,813,386
Fiber Strands Term in the CO (Loop Plant Only)	52,591	59,663	73,260	106,710	138,364	157,957	185,416	205,840	226,360	248,433	310,092
Fiber Term at Customer Premises DS1 Rate	4,681	9,078	13,941	19,132	27,482	36,911	50,431	67,886	85,205	93,687	593,755
Fiber Term at Customer Premises DS3 Rate & Higher	5,490	3,294	4,034	4,559	5,353	6,847	8,974	35,492	94,022	107,998	112,931
ISDN Capable Lines	NA	NA	NA	NA	NA	25,918,582	15,841,265	13,049,642	13,111,821	12,636,844	16,230,309

NA: Not available

Source ARMIS Report 43-07

Table 10 2
Transmission System Data
Total - All Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sheath Kilometers											
Total Sheath Kilometers	5,825,538	5,631,823	5,570,853	5,553,702	5,587,572	5,664,315	5,763,419	5,846,319	5,683,568	5,769,882	5,711,875
Copper	5,248,771	5,281,958	5,185,466	5,127,707	5,124,940	5,163,039	5,212,873	5,255,778	5,063,534	5,097,955	5,017,883
Fiber	291,471	341,415	378,038	419,175	456,814	495,380	536,520	576,868	604,175	655,753	681,587
Other	285,296	8,451	7,350	6,819	5,819	5,896	14,026	13,672	15,860	16,174	12,406
Interoffice Working Facilities											
Total Circuit Links	19,926,411	20,533,013	23,293,421	25,385,271	24,387,840	28,847,081	32,231,481	41,873,877	47,960,986	52,221,937	52,226,424
Loop Plant -- Central Office Terminations											
Total Equipped Channels	227,730,736	248,436,477	254,793,596	263,768,547	255,430,475	264,429,362	279,341,845	299,779,275	313,014,677	356,758,489	362,470,008
Copper	217,154,922	221,879,025	222,353,743	226,953,330	227,384,081	230,903,175	236,490,113	239,486,801	246,638,738	253,939,285	248,684,364
Fiber Digital Carrier	10,569,994	26,549,664	32,433,491	36,809,055	28,041,605	33,515,370	42,846,429	60,287,936	66,371,982	102,815,393	113,783,074
Other	5,821	7,791	6,360	6,162	4,789	10,817	5,303	4,538	3,957	3,811	2,570
Total Working Channels	139,618,361	142,822,216	149,000,831	155,980,548	163,245,940	170,083,120	182,546,160	190,911,880	193,922,477	225,431,349	216,483,361
Copper	132,456,117	133,010,643	136,073,024	141,452,266	144,576,836	147,286,389	151,593,687	151,501,241	151,494,238	151,678,473	137,864,407
Fiber Digital Carrier	7,159,115	9,807,620	12,924,773	14,525,425	18,666,394	22,793,636	30,950,165	39,163,693	42,213,715	73,751,357	78,617,515
Other	3,131	3,955	3,035	2,857	2,710	3,095	2,308	246,946	214,524	1,519	1,439
Other Transmission Facility Data											
Copper Pairs Term Main Frame (Loop Plant Only)	209,059,369	212,060,160	210,515,830	212,867,099	213,115,863	215,534,261	218,990,613	218,470,177	217,441,743	218,397,896	215,320,122
Fiber Strands Term in the CO (Loop Plant Only)	476,713	598,657	982,625	1,203,705	1,465,877	1,651,999	2,019,697	2,125,055	2,881,827	3,267,300	3,008,735
Fiber Term at Customer Premises DS1 Rate	106,758	146,405	184,235	222,040	294,808	363,189	421,075	527,784	647,502	1,282,847	1,888,451
Fiber Term at Customer Premises DS3 Rate & Higher	14,824	16,251	19,963	22,699	32,352	29,893	47,205	92,534	167,284	227,831	253,213
ISDN Capable Lines	NA	NA	NA	NA	NA	105,949,659	107,514,215	122,963,106	116,839,259	105,059,057	105,956,829

NA Not available

Source ARMIS Report 43-07

Table 10 2
Transmission System Data
Verizon - GTE Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sheath Kilometers											
Total Sheath Kilometers	1,610,734	1,367,255	1,314,600	1,234,633	1,248,505	1,268,110	1,290,068	1,312,437	1,041,353	1,053,450	938,012
Copper	1,283,366	1,305,857	1,251,223	1,167,365	1,177,702	1,188,835	1,203,101	1,219,257	959,596	965,586	856,090
Fiber	53,065	61,398	63,377	67,268	70,803	79,275	86,966	93,180	81,757	87,864	81,922
Other	274,303	0	0	0	0	0	0	0	0	0	0
Interoffice Working Facilities											
Total Circuit Links	2,989,915	3,052,854	3,430,454	4,104,644	1,900,698	2,461,398	2,445,471	4,004,974	4,182,896	4,701,614	4,362,338
Loop Plant -- Central Office Terminations											
Total Equipped Channels	28,018,835	28,601,394	28,043,406	30,593,828	30,128,527	30,278,580	31,455,009	42,599,694	44,586,214	41,943,472	42,126,127
Copper	26,644,991	26,989,645	26,280,274	28,716,964	28,146,972	27,709,878	28,240,814	29,880,881	28,590,183	25,616,859	24,678,550
Fiber Digital Carrier	1,370,617	1,607,049	1,758,085	1,871,908	1,978,522	2,559,245	3,209,964	12,715,677	15,994,041	16,325,472	17,446,656
Other	3,227	4,700	5,047	4,956	3,033	9,457	4,231	3,136	1,990	1,141	921
Total Working Channels	18,770,008	18,631,166	18,809,320	19,749,733	20,422,201	20,654,471	21,925,330	23,991,380	23,204,649	22,569,689	21,727,913
Copper	17,846,681	17,514,835	17,636,318	18,476,993	18,981,609	18,850,077	19,726,313	18,207,964	16,585,744	16,781,266	15,789,637
Fiber Digital Carrier	921,388	1,113,803	1,170,276	1,270,132	1,438,571	1,801,556	2,196,916	5,536,831	6,405,057	5,787,826	5,937,838
Other	1,939	2,528	2,726	2,608	2,021	2,838	2,101	246,585	213,848	597	438
Other Transmission Facility Data											
Copper Pairs Term Main Frame (Loop Plant Only)	26,610,870	28,240,402	26,074,368	28,707,803	27,804,891	29,713,980	30,313,513	29,094,240	21,787,495	21,895,961	22,039,455
Fiber Strands Term in the CO (Loop Plant Only)	26,504	38,498	55,481	71,762	80,372	93,238	126,604	43,739	39,394	33,298	31,098
Fiber Term at Customer Premises DS1 Rate	4,455	6,540	7,941	14,619	16,469	23,480	4,846	11,316	289	214	172
Fiber Term at Customer Premises DS3 Rate & Higher	2,031	3,825	4,436	4,546	11,043	2,173	4,439	224	960	980	637
ISDN Capable Lines	NA	NA	NA	NA	NA	12,935,628	13,732,469	16,265,613	18,031,436	12,148,900	11,606,200

NA Not available

Source ARMIS Report 43-07

Table 10 2
Transmission System Data
Qwest Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sheath Kilometers											
Total Sheath Kilometers	743,027	757,868	750,756	753,942	722,753	717,084	722,157	735,920	754,162	762,412	770,660
Copper	699,219	707,384	694,797	691,844	660,393	653,205	650,929	662,816	675,009	676,615	684,193
Fiber	43,808	50,485	55,960	62,098	62,360	63,880	65,171	66,986	69,906	76,585	80,891
Other	0	0	0	0	0	0	6,057	6,119	9,247	9,212	5,576
Interoffice Working Facilities											
Total Circuit Links	2,175,630	2,315,598	2,569,216	2,802,203	3,178,552	3,561,748	4,129,315	5,232,282	6,152,970	6,926,823	7,018,987
Loop Plant -- Central Office Terminations											
Total Equipped Channels	23,533,213	23,876,582	24,088,839	24,246,870	25,284,411	24,893,900	27,316,968	28,023,288	28,733,473	29,643,140	30,106,628
Copper	22,956,294	23,170,964	23,393,955	23,561,093	23,500,796	23,193,518	25,517,759	25,361,821	25,581,184	25,939,651	26,077,832
Fiber Digital Carrier	575,314	703,502	694,588	685,674	1,782,962	1,699,888	1,799,003	2,661,211	3,152,009	3,703,244	4,028,568
Other	1,605	2,116	296	103	653	494	206	256	280	245	228
Total Working Channels	14,175,249	14,809,462	15,322,355	15,347,150	16,359,345	17,195,446	17,455,809	18,011,061	18,009,155	17,058,921	16,260,389
Copper	13,846,854	14,359,158	14,863,489	14,873,448	15,232,212	16,113,600	16,222,185	16,270,241	15,887,131	14,607,962	14,400,788
Fiber Digital Carrier	327,441	449,121	458,790	473,650	1,126,650	1,081,695	1,233,523	1,740,715	2,121,920	2,450,864	1,859,511
Other	954	1,183	76	52	483	151	101	105	104	95	90
Other Transmission Facility Data											
Copper Pairs Term Main Frame (Loop Plant Only)	22,015,832	22,128,231	22,179,411	22,168,426	22,291,697	20,463,591	21,558,602	21,606,866	21,572,942	21,653,395	21,724,140
Fiber Strands Term in the CO (Loop Plant Only)	65,444	73,993	83,313	81,953	112,185	123,691	174,430	202,329	238,802	299,315	309,154
Fiber Term at Customer Premises DS1 Rate	11,837	20,010	24,386	28,875	30,109	46,296	91,105	136,878	267,251	316,665	349,948
Fiber Term at Customer Premises DS3 Rate & Higher	1,434	1,066	1,297	1,289	1,223	1,142	6,085	28,354	38,224	51,546	60,366
ISDN Capable Lines	NA	NA	NA	NA	NA	9,236,841	9,650,185	9,983,398	9,922,088	9,012,052	8,426,381

NA Not available

Source ARMIS Report 43-07

include non-Bell carriers subject to price-cap regulation.[3] Second, the Commission included service quality reports in the Automated Reporting Management Information System (ARMIS).[4] Third, the Commission ordered significant changes to the kinds of data these carriers had to report.[5] Following these developments, the Commission released service quality summary reports in February 1993, March 1994, March 1996, September 1998, December 1999, December 2001, and January 2003.

In 1996, pursuant to requirements in the Telecommunications Act of 1996,[6] the Commission reduced the frequency of the filed data from quarterly to annual submissions.[7] In May 1997, relevant definitions were clarified further. These changes have been reflected starting with data covering the 1997 calendar year.

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3 *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Second Report and Order, 5 FCC Rcd 6786, 6827-31 (1990) (*LEC Price Cap Order*) (establishing the current service quality monitoring program and incorporating the service quality reports into the ARMIS program), Erratum, 5 FCC Rcd 7664 (1990), *modified on recon.*, 6 FCC Rcd 2637 (1991), *aff'd sub nom , Nat'l Rural Telecom Ass'n v. FCC*, 988 F.2d 174 (D.C. Cir. 1993). The incumbent local exchange carriers that are rate-of-return regulated are not subject to federal service quality reporting requirements.

4 *LEC Price Cap Order*, 5 FCC Rcd at 6827-30. The ARMIS database includes a variety of mechanized company financial and infrastructure reports in addition to the quality-of-service reports. Most data are available disaggregated to a study area or state level.

5 *Id.*; *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Memorandum Opinion and Order, 6 FCC Rcd 2974 (1991) (*Service Quality Order*), *recon.*, 6 FCC Rcd 7482 (1991). Previously the Common Carrier Bureau had collected data on five basic service quality measurements from the Bell Operating Companies. These were customer satisfaction levels, dial tone delay, transmission quality, on time service orders, and percentage of call blocking due to equipment failure.

6 *Telecommunications Act of 1996*, Pub. L. No. 104-104, 110 Stat. 56.

7 Orders implementing filing frequency and other reporting requirement changes associated with implementation of the Telecommunications Act of 1996 are as follows: *Implementation of the Telecommunications Act of 1996: Reform of Filing Requirements and Carrier Classifications*, CC Docket No. 96-193, Order and Notice of Proposed Rulemaking, 11 FCC Rcd 11716 (1996); *Revision of ARMIS Quarterly Report (FCC Report 43-01) et al.*, CC Docket No. 96-193, Order, 11 FCC Rcd 22508 (1996); *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313, Memorandum Opinion and Order, 12 FCC Rcd 8115 (1997); *Revision of ARMIS Annual Summary Report (FCC Report 43-01) et al.*, AAD No. 95-91, Order, 12 FCC Rcd 21831 (1997).

Table 10 2
Transmission System Data
SBC Pacific Telesis Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sheath Kilometers											
Total Sheath Kilometers	351,748	351,695	343,658	346,127	349,697	363,726	368,122	363,304	386,093	394,058	382,326
Copper	336,461	334,674	324,942	325,537	327,040	339,207	341,563	334,493	355,133	359,288	343,317
Fiber	13,412	15,814	17,598	19,472	21,513	23,375	25,416	27,648	29,797	33,227	37,466
Other	1,875	1,207	1,118	1,118	1,144	1,144	1,144	1,163	1,163	1,543	1,543
Interoffice Working Facilities											
Total Circuit Links	2,104,431	2,137,179	2,568,706	2,646,904	2,240,779	3,369,967	3,760,855	4,352,282	5,032,433	5,141,975	4,792,666
Loop Plant -- Central Office Terminations											
Total Equipped Channels	25,576,494	26,287,306	26,447,355	26,850,298	27,732,011	28,635,080	29,739,661	30,729,411	33,317,471	34,687,259	34,988,223
Copper	25,239,670	25,859,697	25,914,609	26,178,875	26,951,967	27,548,645	28,348,883	29,062,676	31,479,491	32,170,875	32,337,338
Fiber Digital Carrier	336,737	427,522	532,661	671,162	779,783	1,086,411	1,390,754	1,666,523	1,837,699	2,516,055	2,650,609
Other	87	87	85	261	261	24	24	212	281	329	276
Total Working Channels	15,624,516	15,840,904	16,110,206	16,877,850	17,719,765	18,254,128	20,103,518	20,963,786	23,081,376	22,773,561	22,080,915
Copper	15,400,695	15,556,249	15,758,760	16,448,199	17,212,991	17,569,012	19,235,044	19,936,233	21,930,468	21,380,638	20,803,417
Fiber Digital Carrier	223,744	284,575	351,364	429,536	506,657	685,092	868,450	1,027,425	1,150,752	1,392,728	1,277,338
Other	77	80	82	115	117	24	24	128	156	195	160
Other Transmission Facility Data											
Copper Pairs Term Main Frame (Loop Plant Only)	24,098,663	24,632,897	24,577,002	24,619,462	25,055,625	25,412,880	25,953,289	26,639,408	27,102,231	27,403,873	27,620,878
Fiber Strands Term in the CO (Loop Plant Only)	35,565	39,830	33,538	34,692	37,156	88,192	97,385	101,516	115,670	139,598	182,250
Fiber Term at Customer Premises DS1 Rate	628	701	756	655	719	762	854	894	0	0	0
Fiber Term at Customer Premises DS3 Rate & Higher	1,710	2,410	3,108	4,047	3,113	6,145	7,432	9,456	13,132	16,805	19,925
ISDN Capable Lines	NA	NA	NA	NA	NA	12,803,002	14,007,670	14,466,224	15,930,217	14,563,646	15,240,270

NA Not available

Source ARMIS Report 43-07

The key items contained in the tables are summarized below. Installation, maintenance and customer complaint data are shown in Table 9.1 and switch downtime and trunk servicing data are shown in Table 9.2. Installation and maintenance data are presented separately for services provided to end users and for interexchange carrier access facilities. Outage data categorized by cause are shown in Table 9.3. Customer perception data are contained in Table 9.4 and the associated survey sample sizes are contained in Table 9.5. The tables cover data for 2002. This section displays a number of data elements that have remained roughly comparable over the past few years. More detailed information on the raw data from which this section has been developed is contained on the Commission's website for the ARMIS database noted above and in the report noted in footnote 2. In addition, complete data descriptions are available in several Commission Orders. [10]

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calculate composite installation interval data by summing the individual study area results multiplied by the number of installation orders reported for each study area and then dividing the result by the total number of orders.

10 Orders implementing filing frequency and other reporting requirement changes associated with implementation of the Telecommunications Act of 1996 are as follows: *Implementation of the Telecommunications Act of 1996: Reform of Filing Requirements and Carrier Classifications*, Order and Notice of Proposed Rulemaking, 11 FCC Rcd 11716 (1996); *Revision of ARMIS Quarterly Report (FCC Report 43-01) et al.*, Order, 11 FCC Rcd 22508 (1996); *Policy and Rules Concerning Rates for Dominant Carriers*, Memorandum Opinion and Order, 12 FCC Rcd 8115 (1997); *Revision of ARMIS Annual Summary Report (FCC Report 43-01) et al.*, Order, 12 FCC Rcd 21831 (1997).

Table 10 2
Transmission System Data
Verizon - Bell Atlantic Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sheath Kilometers											
Total Sheath Kilometers	949,646	958,275	967,084	973,148	979,664	992,970	1,008,405	1,022,395	1,038,094	1,046,999	1,080,551
Copper	880,017	877,352	875,728	872,797	871,984	873,583	876,739	879,768	886,323	886,147	912,134
Fiber	66,619	78,415	89,132	98,425	107,141	118,987	130,872	141,888	151,432	160,494	168,185
Other	3,011	2,507	2,224	1,927	539	401	794	739	339	357	232
Interoffice Working Facilities											
Total Circuit Links	5,142,664	5,159,173	5,201,204	5,213,347	5,357,022	5,853,744	6,834,238	8,687,801	10,262,940	11,001,835	11,120,804
Loop Plant -- Central Office Terminations											
Total Equipped Channels	65,747,651	82,980,954	86,021,165	90,107,803	77,287,239	80,327,245	86,996,490	90,777,075	89,384,018	125,406,917	138,190,365
Copper	62,105,433	65,122,822	65,275,522	65,663,036	65,333,981	66,426,101	67,001,475	66,639,008	65,672,215	71,057,709	73,002,465
Fiber Digital Carrier	3,642,219	17,858,134	20,745,643	24,444,767	11,953,258	13,901,144	19,995,015	24,138,067	23,711,803	54,349,208	65,187,900
Other	0	0	0	0	0	0	0	0	0	0	0
Total Working Channels	38,168,035	40,222,933	40,922,175	43,690,966	45,428,073	48,600,177	53,815,181	57,437,438	55,422,738	90,645,132	94,487,929
Copper	36,121,824	36,776,495	36,387,944	37,927,283	37,998,341	39,429,529	39,221,423	39,858,933	39,081,964	43,800,016	37,580,147
Fiber Digital Carrier	2,046,213	3,446,439	4,534,231	5,763,683	7,429,732	9,170,648	14,593,758	17,578,505	16,340,774	46,845,116	56,907,782
Other	0	0	0	0	0	0	0	0	0	0	0
Other Transmission Facility Data											
Copper Pairs Term Main Frame (Loop Plant Only)	59,659,102	60,557,866	60,577,213	60,635,648	60,742,136	61,342,895	61,875,146	61,342,016	60,962,933	60,979,463	62,622,453
Fiber Strands Term in the CO (Loop Plant Only)	213,998	273,279	604,501	704,901	804,787	872,210	1,088,063	1,247,579	1,799,523	1,942,003	1,487,203
Fiber Term at Customer Premises DS1 Rate	33,090	47,833	65,929	78,266	103,307	131,829	106,632	144,981	85,648	604,557	652,777
Fiber Term at Customer Premises DS3 Rate & Higher	676	1,306	1,767	2,333	3,381	4,094	9,515	11,225	10,090	36,396	43,716
ISDN Capable Lines	NA	NA	NA	NA	NA	31,943,090	40,648,786	47,540,926	38,205,741	35,587,450	34,658,178

NA Not available

Source ARMIS Report 43-07

Table 9.2
Switch Downtime & Trunk Blocking
Company Comparison - 2002

Company	BellSouth	Qwest	SBC Ameritech	SBC Pacific	SBC Southwestern	Verizon North	Verizon South	Verizon GTE	Sprint
Total Access Lines in Thousands	22,955	15,682	19,151	17,248	15,294	17,442	21,368	16,894	7,953
Total Trunk Groups	3,577	3,378	1,111	1,581	802	826	1,005	1,669	7,436
Total Switches	1,637	1,337	1,455	778	1,652	1,279	1,344	3,130	1,563
Switches with Downtime									
Number of Switches	68	252	201	32	71	34	28	40	136
As a Percentage of Total Switches	4 2%	18 8%	13 8%	4 1%	4 3%	2 7%	2 1%	1 3%	8 7%
Average Switch Downtime in Seconds per Switch									
For All Events	97 8	95 0	90 5	4 2	49 0	36 3	31 2	117 2	460 8
For Unscheduled Events Over 2 Minutes	88 0	78 0	29 5	3 2	44 7	33 6	30 3	118 9	381 1
For Unscheduled Downtime More Than 2 Minutes									
Number of Occurrences or Events	33	42	25	8	11	26	13	42	71
Events per Hundred Switches	2 0	3 1	1 7	1 0	0 7	2 0	1 0	1 3	4 5
Events per Million Access Lines	1 44	2 68	1 31	0 46	0 72	1 49	0 61	2 49	8 93
Average Outage Duration in Minutes	72 7	41 4	28 6	5 1	111 8	27 6	52 2	147 7	139 8
Average Lines Affected per Event in Thousands	21 8	6 3	28 1	37 5	23 8	23 7	22 2	6 9	12 3
Outage Line-Minutes per Event in Thousands	766 9	218 7	644 9	171 9	2,900 1	483 1	163 6	859 8	1,896 0
Outage Line-Minutes per 1,000 Access Lines	1,102 5	585 7	841 9	79 7	2,085 8	720 1	99 5	2,137 6	16,925 4
For Scheduled Downtime More Than 2 Minutes									
Number of Occurrences or Events	4	51	58	0	7	3	3	1	64
Events per Hundred Switches	0 2	3 8	4 0	0 0	0 4	0 2	0 2	0 0	4 1
Events per Million Access Lines	0 17	3 25	3 03	0 00	0 46	0 17	0 14	0 06	8.05
Average Outage Duration in Minutes	5 1	4 0	24 8	NA	14 3	10 7	2 3	NA	32.4
Avg. Lines Affected per Event in Thousands	8 5	11 2	18 5	NA	52 3	20 8	23 6	NA	9 9
Outage Line-Minutes per Event in Thousands	28 1	53 3	539 9	NA	243 6	203 9	55 6	NA	364 7
Outage Line-Minutes per 1,000 Access Lines	4 9	173 4	1,635 2	0 0	111 5	35 1	7 8	0 4	2,934 9
% Common Trunk Grps Exceeding Blocking Objectives	2 60%	2 19%	8 37%	1 45%	0 25%	3 63%	8 26%	0 06%	0 15%

NA Not available

Please refer to text for notes and data qualifications

Table 10 2
Transmission System Data
Verizon - GTE Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sheath Kilometers											
Total Sheath Kilometers	1,610,734	1,367,255	1,314,600	1,234,633	1,248,505	1,268,110	1,290,068	1,312,437	1,041,353	1,053,450	938,012
Copper	1,283,366	1,305,857	1,251,223	1,167,365	1,177,702	1,188,835	1,203,101	1,219,257	959,596	965,586	856,090
Fiber	53,065	61,398	63,377	67,268	70,803	79,275	86,966	93,180	81,757	87,864	81,922
Other	274,303	0	0	0	0	0	0	0	0	0	0
Interoffice Working Facilities											
Total Circuit Links	2,989,915	3,052,854	3,430,454	4,104,644	1,900,698	2,461,398	2,445,471	4,004,974	4,182,896	4,701,614	4,362,338
Loop Plant -- Central Office Terminations											
Total Equipped Channels	28,018,835	28,601,394	28,043,406	30,593,828	30,128,527	30,278,580	31,455,009	42,599,694	44,586,214	41,943,472	42,126,127
Copper	26,644,991	26,989,645	26,280,274	28,716,964	28,146,972	27,709,878	28,240,814	29,880,881	28,590,183	25,616,859	24,678,550
Fiber Digital Carrier	1,370,617	1,607,049	1,758,085	1,871,908	1,978,522	2,559,245	3,209,964	12,715,677	15,994,041	16,325,472	17,446,656
Other	3,227	4,700	5,047	4,956	3,033	9,457	4,231	3,136	1,990	1,141	921
Total Working Channels	18,770,008	18,631,166	18,809,320	19,749,733	20,422,201	20,654,471	21,925,330	23,991,380	23,204,649	22,569,689	21,727,913
Copper	17,846,681	17,514,835	17,636,318	18,476,993	18,981,609	18,850,077	19,726,313	18,207,964	16,585,744	16,781,266	15,789,637
Fiber Digital Carrier	921,388	1,113,803	1,170,276	1,270,132	1,438,571	1,801,556	2,196,916	5,536,831	6,405,057	5,787,826	5,937,838
Other	1,939	2,528	2,726	2,608	2,021	2,838	2,101	246,585	213,848	597	438
Other Transmission Facility Data											
Copper Pairs Term Main Frame (Loop Plant Only)	26,610,870	28,240,402	26,074,368	28,707,803	27,804,891	29,713,980	30,313,513	29,094,240	21,787,495	21,895,961	22,039,455
Fiber Strands Term in the CO (Loop Plant Only)	26,504	38,498	55,481	71,762	80,372	93,238	126,604	43,739	39,394	33,298	31,098
Fiber Term at Customer Premises DS1 Rate	4,455	6,540	7,941	14,619	16,469	23,480	4,846	11,316	289	214	172
Fiber Term at Customer Premises DS3 Rate & Higher	2,031	3,825	4,436	4,546	11,043	2,173	4,439	224	960	980	637
ISDN Capable Lines	NA	NA	NA	NA	NA	12,935,628	13,732,469	16,265,613	18,031,436	12,148,900	11,606,200

NA. Not available

Source ARMIS Report 43-07

Table 9.4
Customer Perception Surveys - Percent of Customers Dissatisfied
Company Comparision - 2002

Company	BellSouth	Qwest	SBC Amentech	SBC Pacific	SBC Southwestern	Verizon North	Verizon South	Verizon GTE	Sprint
Installations:									
Residential	10 25	7 17	10 67	6 35	8 12	5 26	5 07	4 36	NA
Small Business	9 58	15 93	11 85	6 30	8 87	9.20	8 16	7 69	NA
Large Business	7 33	NA	10 69	5 55	6 44	1 84	2 73	4 79	NA
Repairs:									
Residential	14 60	9.30	14 57	7 25	9 63	15 96	14 62	12 36	NA
Small Business	8.49	11 82	12 81	5 61	6 76	11 89	9 53	9 05	NA
Large Business	6 67	NA	11 67	4 08	5 90	4 39	2 98	4 42	NA
Business Office:									
Residential	12 26	3.63	13.23	5 96	8 88	6 78	5 71	6 20	NA
Small Business	14 26	7.09	12.48	5 79	7.67	7 67	8 73	9 04	NA
Large Business	9 00	NA	10 99	5 88	6.67	2 21	6 86	5 73	NA

NA Not available

Please refer to text for notes and data qualifications

Table 10 2
Transmission System Data
SBC Southwestern Bell Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sheath Kilometers											
Total Sheath Kilometers	637,840	646,283	652,224	662,108	676,945	685,526	700,914	715,915	734,982	749,279	758,096
Copper	605,825	608,238	609,725	612,764	617,776	622,960	634,236	645,280	657,915	665,754	671,033
Fiber	28,407	35,548	40,621	47,530	57,228	60,561	66,074	70,023	76,442	82,893	86,431
Other	3,608	2,497	1,878	1,814	1,942	2,005	604	612	625	632	632
Interoffice Working Facilities											
Total Circuit Links	2,028,241	2,132,469	2,271,891	2,583,685	2,887,611	3,374,225	4,013,947	5,040,973	5,747,378	6,133,750	6,011,924
Loop Plant -- Central Office Terminations											
Total Equipped Channels	23,280,470	22,801,616	23,675,325	23,990,229	23,765,557	26,003,155	26,573,984	27,781,986	28,466,090	33,579,340	35,090,790
Copper	22,835,410	21,895,338	22,010,813	23,356,682	22,976,132	24,957,200	25,399,685	26,437,109	27,047,348	30,533,897	31,634,863
Fiber Digital Carrier	444,970	906,188	1,664,422	633,547	789,425	1,045,955	1,174,299	1,344,877	1,418,742	3,045,443	3,455,927
Other	90	90	90	0	0	0	0	0	0	0	0
Total Working Channels	13,400,320	13,431,477	15,446,486	15,917,610	16,579,937	16,305,661	17,626,797	17,857,937	18,053,445	16,482,996	15,888,373
Copper	13,047,301	12,703,861	14,046,786	15,376,311	15,937,288	15,532,286	16,738,819	16,854,720	16,970,439	15,386,074	14,767,650
Fiber Digital Carrier	352,945	727,542	1,399,626	541,299	642,649	773,375	887,978	1,003,217	1,083,006	1,096,922	1,120,723
Other	74	74	74	0	0	0	0	0	0	0	0
Other Transmission Facility Data											
Copper Pairs Term Main Frame (Loop Plant Only)	22,047,874	21,379,496	22,010,903	21,990,829	22,185,268	22,926,817	22,904,300	23,579,244	24,032,521	24,062,333	24,290,865
Fiber Strands Term in the CO (Loop Plant Only)	41,947	56,560	66,497	124,026	189,365	193,409	206,178	158,881	256,736	329,584	388,011
Fiber Term at Customer Premises DS1 Rate	33,162	38,568	44,622	48,552	77,598	77,545	113,701	103,739	130,287	160,740	172,872
Fiber Term at Customer Premises DS3 Rate & Higher	1,612	1,916	2,566	2,733	4,365	5,039	5,615	1,995	3,668	4,523	4,828
ISDN Capable Lines	NA	NA	NA	NA	NA	3,773,275	4,157,674	12,158,269	12,168,819	12,055,812	11,177,094

NA Not available

Source ARMIS Report 43-07

Table 10 2
Transmission System Data
SBC Ameritech Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sheath Kilometers											
Total Sheath Kilometers	552,792	556,814	537,133	562,934	575,407	586,712	598,858	601,779	612,988	629,321	636,725
Copper	522,374	521,187	498,239	519,775	526,955	533,491	541,197	540,170	546,336	555,024	558,670
Fiber	29,468	34,655	37,980	42,370	47,676	52,450	56,687	60,637	65,632	73,334	77,084
Other	950	971	915	789	776	771	974	972	1,020	964	971
Interoffice Working Facilities											
Total Circuit Links	2,783,389	2,800,655	2,964,296	3,278,058	3,577,253	4,118,183	4,912,927	5,990,907	6,753,643	7,625,684	8,084,023
Loop Plant -- Central Office Terminations											
Total Equipped Channels	29,831,652	30,818,287	31,847,802	31,957,236	33,365,840	34,740,814	36,301,862	37,842,246	39,092,223	40,436,388	42,145,712
Copper	28,551,452	29,549,359	29,482,850	29,124,886	29,571,017	29,797,059	30,063,619	30,255,769	30,775,153	30,444,126	30,690,174
Fiber Digital Carrier	1,280,200	1,268,928	2,364,952	2,832,350	3,794,823	4,943,755	6,238,243	7,586,477	8,317,070	9,992,262	11,455,538
Other	0	0	0	0	0	0	0	0	0	0	0
Total Working Channels	19,283,745	18,610,716	19,105,653	19,714,345	20,506,219	21,152,075	21,782,557	22,227,572	22,495,633	21,786,411	20,997,868
Copper	18,317,812	17,811,513	18,096,153	18,478,770	18,896,376	19,082,995	19,216,231	19,135,507	18,993,978	18,124,703	17,272,552
Fiber Digital Carrier	965,933	799,203	1,009,500	1,235,575	1,609,843	2,069,080	2,566,326	3,092,065	3,501,655	3,661,708	3,725,316
Other	0	0	0	0	0	0	0	0	0	0	0
Other Transmission Facility Data											
Copper Pairs Term Main Frame (Loop Plant Only)	28,244,797	28,687,860	28,645,733	28,217,638	28,693,470	28,970,660	29,303,138	29,605,539	30,212,004	29,938,625	30,208,945
Fiber Strands Term in the CO (Loop Plant Only)	40,664	56,834	66,035	79,661	103,648	123,302	141,621	165,171	205,342	275,069	300,927
Fiber Term at Customer Premises DS1 Rate	18,905	23,675	26,660	31,941	39,124	46,366	53,506	62,090	78,822	106,984	118,927
Fiber Term at Customer Premises DS3 Rate & Higher	1,871	2,434	2,755	3,192	3,874	4,453	5,145	5,788	7,188	9,583	10,810
ISDN Capable Lines	NA	NA	NA	NA	NA	9,339,241	9,476,166	9,499,034	9,469,137	9,054,353	8,618,397

NA Not available

Source ARMIS Report 43-07

on hybrid copper/fiber interfaces in the network but the carriers have requested proprietary treatment for the data. As a result, the data are not provided in this public report.

The ARMIS 43-07 reports are filed only by those local exchange companies originally subject to mandatory price-cap regulation--the Bell operating companies (BOCs).[5] Together, these large companies are estimated to provide service to more than 90% of the nation's telephone lines. The data are generally filed at the study area level, which typically consists of a company's operations within a state. The state-by-state data are available from the Commission's ARMIS web page at <http://www.fcc.gov/wcb/eafs/>.[6] This web page has been redesigned and provides more features than were previously available. The information summarized in this report is organized into two sets of tables with the following designations: Table 10.1 shows switching system data and gross plant expenditures covering all types of plant. Table 10.2 shows transmission system data. Each set of tables contains segments for each of the regional Bell operating companies (along with Verizion's GTE companies shown separately) with aggregated summary data for all the reporting companies. The data summarized for each holding company reflect the aggregate of data filed for individual states or study areas and should be useful in assessing overall trends. In some cases, refiled data may cause values to differ from prior summary reports. Recent data reflect mergers of GTE and Bell Atlantic, which are now under the name Verizon Communications, and the acquisitions by SBC of Ameritech and Pacific Telesis.

Description of the Technologies and Analysis of the Data

The data in the attached tables provide a historical series for a variety of plant elements that illustrate the deployment of technology in the networks of the major local exchange carriers.[7] The data items provide a picture of the well established technologies in use. This report highlights key trends in the evolution of basic telecommunications infrastructure and illustrates the replacement of older technologies with newer ones. In some cases, older technologies either no longer exist or are in very limited use. This report reflects recent revisions to the ARMIS 43-07 report from which the data in this summary are obtained.[8]

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5 See footnote 1.

6 To access ARMIS data from <www.fcc.gov/wcb/eafs> click on the words "run the application primary link and select the desired report, table and row(s)." To access data instructions and definitions applicable to the 43-07 report click on the words ARMIS site map at the top right of the screen and then select the 43-07 report and table desired.

7 A number of irregularities including time series anomalies were noted in the data. The companies are typically notified of these observed problems and either file revisions or explanations. Revisions are initially made available on the ARMIS database website noted above.

8 *2000 Biennial Regulatory Review – Comprehensive Review of the Accounting Requirements and ARMIS Reporting Requirements for Incumbent Local Exchange Carriers: Phase 2; Amendments to the Uniform System of Accounts for Interconnection;*

Table 10.2
Transmission System Data
BellSouth Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Sheath Kilometers											
Total Sheath Kilometers	979,751	993,633	1,005,397	1,020,809	1,034,601	1,050,186	1,074,896	1,094,569	1,115,897	1,134,363	1,145,506
Copper	921,509	927,265	930,812	937,626	943,090	951,758	965,108	973,995	983,221	989,541	992,446
Fiber	56,692	65,100	73,370	82,012	90,093	96,852	105,335	116,507	129,209	141,356	149,609
Other	1,550	1,268	1,215	1,171	1,418	1,576	4,453	4,067	3,466	3,466	3,452
Interoffice Working Facilities											
Total Circuit Links	2,702,141	2,935,085	4,287,654	4,756,430	5,245,925	6,107,816	6,134,728	8,564,658	9,828,726	10,690,256	10,835,682
Loop Plant -- Central Office Terminations											
Total Equipped Channels	31,742,421	33,070,338	34,669,704	36,022,283	37 866,890	39,550,588	40,957,871	42,025,575	49,435,188	51,061,973	39,822,163
Copper	28,821,672	29,291,200	29,995,720	30,351,794	30,903,216	31,270,774	31,917,878	31,849,537	37,493,164	38,176,168	30,263,142
Fiber Digital Carrier	2,919,937	3,778,341	4,673,140	5,669,647	6,962,832	8,278,972	9,039,151	10,175,104	11,940,618	12,883,709	9,557,876
Other	812	798	842	842	842	842	842	934	1,406	2,096	1,145
Total Working Channels	20,196,488	21,275,558	23,284,636	24,682,894	26,230,400	27 921,162	29,836,968	30,422,706	33,655,481	34,114,639	25,039,974
Copper	17,874,950	18,288,532	19,283,574	19,871,262	20,318,019	20,708,890	21,233,672	21,237,643	22,044,514	21,597,814	17,250,216
Fiber Digital Carrier	2,321,451	2,986,937	4,000,986	4,811,550	5,912,292	7,212,190	8,603,214	9,184,935	11,610,551	12,516,193	7,789,007
Other	87	90	77	82	89	82	82	128	416	632	751
Other Transmission Facility Data											
Copper Pairs Term Main Frame (Loop Plant Only)	26,382,231	26,433,408	26,451,200	26,527,293	26,342,776	26,703,438	27,082,625	26,602,864	31,771,617	32,464,246	26,813,386
Fiber Strands Term in the CO (Loop Plant Only)	52,591	59,663	73,260	106,710	138,364	157,957	185,416	205,840	226,360	248,433	310,092
Fiber Term at Customer Premises DS1 Rate	4,681	9,078	13,941	19,132	27,482	36,911	50,431	67,886	85,205	93,687	593,755
Fiber Term at Customer Premises DS3 Rate & Higher	5,490	3,294	4,034	4,559	5,353	6,847	8,974	35,492	94,022	107,998	112,931
ISDN Capable Lines	NA	NA	NA	NA	NA	25,918,582	15,841,265	13,049,642	13,111,821	12,636,844	16,230,309

NA Not available

Source ARMIS Report 43-07

Although the overall level of growth in fiber has been high, its use in the local loop at present appears to be relatively small. The reporting companies included in this report had an installed base of about 215 million copper-pair mainframe terminations in their central offices for local loop use in 2002. In comparison, about 3 million fiber loop central office terminations had been installed by end-of-year 2002. The data show that the number of these terminations actually declined by about 8.6% during 2002 as compared to an increase of over 13% in 2001. In 2002 more modest growth in DS-3 terminations on fiber facilities is evident as compared to prior years. Over the longer term, fiber and hybrid copper/fiber systems will likely become increasingly important in the local loop as the number of high-quality copper pairs available to support higher data rate digital services declines.

As noted earlier, the data presented in this report do not include data associated with hybrid fiber/copper interfaces including information on offerings of xDSL services for which the companies requested proprietary treatment.[11] Nonetheless the number of ISDN capable lines can be used as an upper bound for potential broadband availability over copper loops, since copper loop characteristics necessary to support ISDN services are also required for newer xDSL services.[12] Readers interested in more disaggregated information may wish to examine data at a more localized level than presented here.[13]

(authored by J. Kraushaar, Industry Analysis and Technology Division, Wireline Competition Bureau, Federal Communications Commission).

11 xDSL (Digital Subscriber Loop) services that are now available offer broadband digital capability using special terminal equipment that enhances the capability of existing copper access lines.

12 Table 10.1 includes the number of switch terminations that are available for ISDN and ISDN capable lines. Table 10.2 includes the number of copper loops that are capable of supporting ISDN.

13 Individual study-area data are also available to address more localized issues. This information is available from the ARMIS web page at <www.fcc.gov/wcb/eafs/>.

Table 10.1
Switching Data
Verizon - GTE Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Local Switches	6,597	6,731	6,155	6,274	6,499	6,453	6,538	6,659	5,136	5,190	4,423
Tandems	162	158	143	157	166	165	162	164	150	151	136
Hosts	924	955	849	884	929	939	955	945	742	761	652
Remotes (Stand Alone Only)	1,558	1,732	1,767	2,031	1,925	1,960	2,738	2,861	2,088	2,134	2,100
Total Switches	6,632	6,769	6,172	6,291	6,520	6,483	6,604	6,691	5,174	5,235	4,462
Analog Stored Program Control	83	78	46	26	17	10	0	0	0	0	0
Digital Stored Program Control	5,209	5,494	5,192	5,586	6,109	6,305	6,604	6,691	5,174	5,235	4,462
Total Number Access Lines in Service (000)	15,781	16,274	16,064	16,641	17,393	18,321	19,105	20,015	18,709	18,503	16,894
Analog Stored Program Control Lines Served	1,030	834	508	378	242	197	0	0	0	0	0
Digital Stored Program Control Lines Served	13,491	14,357	14,759	15,731	16,866	17,966	19,105	20,015	18,709	18,503	16,894
Total Switches Equipped w/SS7-394 (InterLATA) Svc	1,499	2,034	2,250	2,930	3,897	4,215	5,527	6,309	5,021	5,156	4,429
Total Switches Equipped with ISDN	218	272	270	390	523	779	1,246	1,385	884	913	949
Lines with Access to ISDN (000)	1,399	2,095	5,003	6,249	9,678	10,619	14,574	14,926	14,064	13,830	13,320
Basic Rate ISDN (BRI) Interfaces Equipped	22,763	30,741	63,012	91,326	98,145	126,946	139,471	167,964	173,507	173,220	169,320
Primary Rate ISDN (PRI) Interfaces Equipped	475	896	1,406	2,703	7,377	16,465	36,386	47,588	62,652	70,524	69,281

Source ARMIS Report 43-07

Table 10.1
Switching Data
BellSouth Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Local Switches	1,664	1,661	1,658	1,647	1,650	1,654	1,653	1,649	1,644	1,642	1,637
Tandems	66	70	70	71	70	70	71	71	73	77	77
Hosts	272	269	280	289	297	317	307	306	297	304	305
Remotes (Stand Alone Only)	703	714	732	742	747	766	765	765	776	819	829
Total Switches	1,678	1,680	1,677	1,668	1,670	1,674	1,673	1,668	1,665	1,665	1,664
Analog Stored Program Control	283	236	182	158	130	106	100	83	69	54	44
Digital Stored Program Control	1,395	1,444	1,495	1,510	1,540	1,568	1,573	1,585	1,596	1,611	1,620
Total Number Access Lines in Service (000)	18,607	19,233	20,141	21,064	22,019	23,080	23,909	24,458	24,558	23,756	22,955
Analog Stored Program Control Lines Served	7,173	5,929	4,837	4,455	4,020	3,746	3,536	2,972	2,362	1,729	1,309
Digital Stored Program Control Lines Served	11,434	13,304	15,304	16,609	17,999	19,334	20,373	21,486	22,197	22,027	21,646
Total Switches Equipped w/SS7-394 (InterLATA) Svc	966	1,447	1,627	1,629	1,652	1,674	1,673	1,668	1,665	1,665	1,664
Total Switches Equipped with ISDN	224	324	407	467	518	584	596	645	691	678	697
Lines with Access to ISDN (000)	4,934	7,606	9,708	10,988	12,948	14,894	15,980	17,413	18,396	17,660	17,457
Basic Rate ISDN (BRI) Interfaces Equipped	50,774	65,607	76,348	80,641	122,043	167,512	183,458	202,391	223,294	228,898	230,066
Primary Rate ISDN (PRI) Interfaces Equipped	559	1,814	3,534	4,803	9,154	21,389	33,564	51,669	72,347	85,983	81,328

Source ARMIS Report 43-07

Table 10.1
Switching Data
SBC Southwestern Bell Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Local Switches	1,392	1,437	1,511	1,644	1,670	1,690	1,644	1,658	1,663	1,660	1,652
Tandems	67	64	60	60	60	60	67	56	69	70	70
Hosts	191	230	233	245	241	267	230	228	229	230	244
Remotes (Stand Alone Only)	488	672	779	935	1,077	1,077	1,158	1,163	1,152	1,150	1,150
Total Switches	1,425	1,469	1,539	1,679	1,730	1,750	1,711	1,727	1,715	1,716	1,722
Analog Stored Program Control	348	308	264	252	162	136	115	88	67	46	34
Digital Stored Program Control	855	1,078	1,202	1,369	1,568	1,614	1,596	1,639	1,648	1,670	1,688
Total Number Access Lines in Service (000)	12,693	13,180	13,611	14,095	14,104	15,306	15,872	16,287	16,411	15,842	15,294
Analog Stored Program Control Lines Served	7,455	7,078	6,608	6,531	5,657	5,055	4,119	3,107	2,246	1,448	963
Digital Stored Program Control Lines Served	4,924	6,000	6,907	7,502	8,447	10,251	11,753	13,180	14,165	14,394	14,331
Total Switches Equipped w/SS7-394 (InterLATA) Svc	607	723	1,263	1,466	1,597	1,724	1,707	1,724	1,713	1,713	1,722
Total Switches Equipped with ISDN	92	92	123	303	331	331	360	428	441	461	472
Lines with Access to ISDN (000)	1,964	1,476	1,933	8,826	9,440	10,577	13,361	12,158	12,169	12,056	11,241
Basic Rate ISDN (BRI) Interfaces Equipped	88,960	88,960	57,041	108,784	104,604	185,018	225,427	267,190	281,459	310,326	308,501
Primary Rate ISDN (PRI) Interfaces Equipped	380	410	1,238	5,084	6,150	15,434	31,570	46,533	59,513	68,236	68,793

Source ARMIS Report 43-07

Table 10.1
Switching Data
SBC Ameritech Companies

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Local Switches	1,433	1,422	1,413	1,415	1,410	1,435	1,419	1,432	1,447	1,451	1,455
Tandems	46	47	47	46	46	47	51	52	53	55	63
Hosts	178	230	236	238	236	243	236	234	234	235	236
Remotes (Stand Alone Only)	666	684	717	731	743	769	764	775	790	789	790
Total Switches	1,473	1,469	1,460	1,461	1,456	1,482	1,470	1,485	1,500	1,506	1,518
Analog Stored Program Control	318	224	119	97	71	58	46	39	37	34	24
Digital Stored Program Control	1,155	1,245	1,341	1,364	1,385	1,424	1,424	1,446	1,463	1,472	1,494
Total Number Access Lines in Service (000)	16,887	17,500	18,122	19,310	19,553	20,335	20,790	21,036	20,898	20,074	19,151
Analog Stored Program Control Lines Served	7,898	5,862	3,845	3,727	3,228	2,793	2,193	1,811	1,730	1,491	927
Digital Stored Program Control Lines Served	8,988	11,638	14,278	15,583	16,324	17,541	18,597	19,225	19,168	18,583	18,224
Total Switches Equipped w/SS7-394 (InterLATA) Svc	646	1,001	1,254	1,400	1,438	1,463	1,451	1,476	1,492	1,496	1,504
Total Switches Equipped with ISDN	181	387	444	489	601	695	784	816	822	844	933
Lines with Access to ISDN (000)	3,839	8,056	10,259	12,860	13,802	15,464	16,804	17,472	17,388	16,814	16,810
Basic Rate ISDN (BRI) Interfaces Equipped	56,352	67,415	87,862	97,550	226,355	180,280	220,867	259,312	271,468	283,600	290,367
Primary Rate ISDN (PRI) Interfaces Equipped	728	707	1,505	1,677	4,247	14,569	24,800	38,037	53,926	70,542	75,184

Source ARMIS Report 43-07