CHANGES IN THE U.S. TELECOMMUNICATIONS INDUSTRY AND THE IMPACT ON U.S. TELECOMMUNICATIONS TRADE

Report to the Committee on Finance, United States Senate, on Investigation No. 332-172 Under Section 332 of the Tariff Act of 1930

USITC PUBLICATION 1542

JUNE 1984

United States International Trade Commission / Washington, D.C. 20436

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Preface

On November 15, 1984, at the request of the Committee on Finance, United States Senate (app. A) and in accordance with section 332(g) of the Tariff Act of 1930 (19 U.S.C. 1332(g)), the United States International Trade Commission instituted investigation No. 332-172 for the purpose of gathering information in order that it might report by June 18, 1984, to the Committee on the possible implications of recent court and regulatory changes and of the American Telephone & Telegraph Corp. (A.T. & T.) divestiture on trade in telecommunications equipment. The study presents (1) a profile of the U.S. telecommunications industry with emphasis on its present and future competitive position in U.S. and foreign markets in light of court and regulatory actions, especially the A.T. & T. divestiture; (2) an analysis of key economic factors in the U.S. market for telecommunications equipment including consumption, shipments, trade, and other relevant factors; (3) proposed trade nomenclature, imports, and exports to provide an accurate U.S. trade information base for telecommunications equipment; 1/ and (4) the estimated impact of divestiture on the level and composition of trade in the near and long term.

Notice of the investigation was given by posting copies of the notice of investigation at the Office of the Secretary, U.S. International Trade Commission, Washington, D.C., and by publishing the notice in the Federal Register (48 F.R. 55643, Dec. 14, 1983). The notice of hearing was posted similarly and was published in the Federal Register (48 F.R. 57381, Dec. 29, 1983). Both notices are shown in appendix B.

In the course of the investigation, the Commission collected data from questionnaires sent to U.S. producers, importers, purchasers, and prospective purchasers of telecommunications equipment. 2/ Also, Department of State airgrams were sent to U.S. Embassies in countries which are principal U.S. sources of imported telecommunications equipment. The Commission examined the four major categories of telecommunications equipment, i.e., transmission, switching, customer premises, and cable, wire, and lightguide for the purpose of demonstrating the effects on international trade of recent court and regulatory decisions and of A.T. & T.'s divestiture of its 22 operating companies. The groupings are recognized by the industry as major product subsectors. In addition, a subcategory of switching equipment, class 5 central office switches, and four subcategories of customer premises equipment, private branch exchanges, telephone sets, key system switching equipment, and data terminals, were analyzed in order to provide a more detailed review of important product lines.

1/ The Commission responded to the Committee's request for proposed trade nomenclature by supplying recommended amendments to the Tariff Schedules of the United States Annotated (1984) (TSUSA) and the Schedule B in a letter dated Feb. 29, 1984. The Commission's recommendation was expanded upon at the Committee's request on Mar. 26, 1984.

2/ Prospective purchasers were statistically selected from the largest 500 U.S. manufacturers and the largest 500 U.S. service companies in terms of sales or revenues in 1982.

The Commission, in order to provide an estimate of the future competitive position of the U.S. telecommunications industry, prepared three scenarios depicting the short-term (1984-88) and long-term (1989-93) markets in the United States. Of the three scenarios, the first is a projection using historical trends of data for 1967-83, the second uses estimates by respondents to the Commission's questionnaires to forecast the future, and the third represents the Commission's estimate of future trends based on trade articles and information obtained from discussions with industry officials and financial analysts. The short- and long-term results of this increased competition are projected in this report with the understanding that future changes in the market environment brought about by legislative, judicial, or regulatory action could significantly alter not only the composition of the telecommunications equipment industry, but the competitive performance as well. Also, the expected rapid advance in product technology will most likely bring about significant changes in competition in the marketplace.

A public hearing on this matter was held on April 24, 1984, in the Commission's Hearing Room in Washington, D.C. Testimony was presented by the witnesses named in appendix C. Several firms provided briefs in lieu of presenting testimony. Additionally, information was collected through interviews with interested parties in this investigation, trade associations, U.S. Embassies, and U.S. Government agencies, as well as from research papers.

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Note.--The whole of the Commission's report to the Committee on Finance of the United States Senate may not be made public since it contains certain information that would result in the disclosure of the operations of individual concerns. This report is the same as the report to the Committee on Finance except that the above-mentioned information has been omitted. Such omissions are indicated by asterisks.

SUMMARY

The term "telecommunications" as used in this report covers voice, data, and record point-to-point communications, but excludes entertainment broadcast services. In this report, telecommunications equipment comprises four major categories: transmission equipment; switching apparatus; customer premises equipment; and cable, wire, and lightguide. Transmission equipment includes any apparatus which functions to forward information, including telephone messages, data, telegraph signals, and television signals, from one point to another. The transmission may be by radiation (transmitted freely in space or guided in pipes or fibers) or by conduction through wires or cables. Switching apparatus is that equipment designed to permit the connection of any terminals or groups of terminals to any others, including auxiliary and ancillary apparatus necessary for traffic management, network control, and accounting. Customer premises equipment consists principally of terminal equipment (i.e., telephone instruments) and certain switching equipment, including private branch exchanges (PBX's) and key system switching equipment. Such equipment is usually designed to be located in facilities not owned by the carrier. Cable, wire, and lightguide are used as conductors or conduits for transmission between terminals, switches, and transmission apparatus in those cases where the link is not made by radio.

In most foreign nations, the telecommunications service industries are either monopolistic or government owned. However, in the United States and a few other nations, most notably the United Kingdom, advancement has begun toward an open competitive status with many firms providing the same or similar services versus the historical operation of networks by one or a few firms. Through legislative, judicial, and regulatory actions, many firms are now permitted to provide equipment to the telecommunications networks and are given the opportunity to bypass all or part of the public network, thereby creating a much higher demand for communications services, principally data and record transmission and reception.

The captive U.S. market composed of the Bell operating companies was serviced mainly by A.T. & T. until January 1, 1984. This firm supplied telecommunications equipment to approximately 85 percent of the active subscriber lines in the United States. The effect of the divestiture of the local operating companies on January 1, 1984, was to separate the local operating companies, the primary purchasers of telecommunications equipment, from Western Electric Co., the principal supplier.

The industry in the United States is currently in a state of transition; because of divestiture, manufacturers are attempting to obtain increased market share in the products traditionally supplied by Western Electric Co. to the Bell operating companies. The transition to more open competition has also increased the opportunity for foreign manufacturers to compete with traditional U.S. producers, as well as new U.S. producers, in the domestic market. Additionally, rapid advances in product technology such as digital techniques and light modulation have led to innovations in equipment for use in telecommunications.

The major findings of this study of the U.S. telecommunications industry are as follows:

1. THE U.S. INDUSTRY AND ITS POSITION IN DOMESTIC AND INTERNATIONAL MARKETS

- o The U.S.-based telecommunications industry remains the largest in the world, accounting for approximately 32 percent of worldwide telecommunications industry shipments and supplying 37 percent of all subscriber lines in service in 1982.

U.S. producers' shipments of all telecommunications equipment increased by 39.5 percent during 1979-83, from $12.8 billion to $17.8 billion. U.S. companies worldwide accounted for approximately 40 percent of worldwide sales of these products. The fastest growing segment of the telecommunications industry was the transmission equipment sector, in which domestic producers shipments increased by 120 percent during 1979-83, from $2.3 billion to $5.0 billion.

The U.S. telecommunications service industry was supplied with the largest volume of subscriber lines worldwide as of 1982. These 105.4 million subscriber lines represented a 46-percent increase compared with 72.1 million lines in 1971. However, the U.S. share of the total number of subscriber lines worldwide declined during 1971-82 from 45 to 37 percent, mainly because of rapid telecommunications development in other nations.

- o The U.S. telecommunications industry has expanded rapidly; about 550 firms produced telecommunications equipment in the United States in 1983 compared with fewer than 380 firms in 1978.

Of the estimated 550 firms providing telecommunications equipment to the U.S. market in 1983, 10 firms supply about 90 percent of the total market. In contrast, fewer than 380 firms supplied the market in 1978; four or fewer provided 90 percent. A number of new U.S. producers are U.S. subsidiaries of foreign firms based in Japan, Canada, West Germany, and Sweden. Some U.S. producers have formed subsidiares in foreign countries. Fewer than 10 firms provide 90 percent of the market for transmission and switching equipment, although some of those firms are not the same for both product categories. In customer premises equipment, about 20 firms supplied 90 percent of the market. In cable, wire, and lightguide, only three firms supplied 90 percent of the market in 1983, up slightly from the number of firms in 1978.

- o The U.S. producers' share of the domestic market declined during 1978-83 from 97.0 to 89.2 percent.

Although domestic shipments increased from $10.5 billion to $17.8 billion, increased market penetration by imports contributed to the decreased share of the domestic market accounted for by domestic producers. According to information supplied by U.S. purchasers in response to the Commission's questionnaire, exchange-rate fluctuations had little or no effect on the decreasing domestic market share of U.S. producers. However, compatibility

of products, availability, service, and other performance factors played a significant role in maintaining the U.S. purchasers' preference for domestic merchandise.

- o U.S. producers reported decreases in capacity utilization from 75 percent in 1981 to 72 percent in 1983 as production capacity increased by 11 percent.

Production capacity of U.S. producers increased from 109 percent of their 1980 capacity to 120 percent during 1981-83, primarily through rapid expansion by smaller firms. Data supplied in response to the Commission's questionnaire indicated that the industry's expectations of rapid growth spanned all sectors of the telecommunications industry and involved both the smaller and the larger firms. For certain telecommunications components, the growth of future production capacity depends upon anticipated technological developments.

- o Employment of production and related workers engaged in the manufacture of telecommunications equipment decreased during 1981-83.

Total employment as reported to the Commission by U.S. firms producing telecommunications equipment decreased by less than * * * percent between 1981 and 1983 to * * * persons. However, as the industry reorganized in anticipation of the breakup of A.T. & T., employment by these firms of production and related workers engaged in the production of telecommunications equipment declined by 11 percent, from * * * in 1981 to * * * in 1983, and as a share of their total employment from * * * to * * * percent. The average number of manhours worked per person decreased from * * * in 1981 to * * * in 1983, but the workers' average annual compensation increased from * * in 1981 to * * * in 1983. An anticipated rise to an annual average employment of * * * workers in 1984-89 and an expected increase reported in the number of manhours worked per year to * * * per person annually during 1984-88 indicate some U.S. producers' expectations of overtime operations.

- o U.S. producers report heavy investment in domestic plants and equipment, along with small, but growing, investment abroad.

In response to the Commission's questionnaire U.S. producers reported significant increases in capital expenditures during 1981-83, as investment in machinery for domestic facilities increased from * * * million in 1981 to * * * million in 1983. These producers predict their annual expenditures for machinery to increase to an average of * * * billion by 1988. A key factor affecting the production climate in the United States noted by respondents to the questionnaire was the breakup of A.T. & T.

Foreign investment in machinery by U.S. producers, which increased from * * * million to * * * million during 1981-83, is expected to increase sharply by 1988, as a greater availability of skilled personnel and a ready source of low-cost parts and subassemblies indicate an improved production climate in foreign countries.

- o U.S. producers report that their investments in research and development increased from * * * million (* * * percent of product shipments) in 1981 to * * * million (* * * percent of product shipments) in 1983.

U.S. producers reporting to the Commission indicated significant increases in research and development (R. & D.) expenditures focusing on domestic production in all industry sectors. The largest increases came in customer premises equipment, where R. & D. investment increased by approximately 60 percent, from * * * million to * * * million, during 1981-83, reflecting a concentration on development of new products such as private branch exchanges and data terminals. This also reflects a growing competition in the domestic marketplace.

- o U.S. firms remain foremost in telecommunications technology.

U.S. firms continued to lead the world in the technologies associated with telecommunications equipment according to industry sources. A significant measure of U.S. technology leadership is royalty payments. Royalty payments paid to foreign firms totaled $2.8 million, or about one-fifth of those received by the reporting U.S. companies in 1983.

- o U.S. exports of telecommunications equipment increased by more than 79 percent during 1978-83, and the ratio of exports to all producers' shipments also increased from 7.2 to 7.5 percent during the same period. However, U.S. exports accounted for less than 4 percent of foreign consumption throughout this period.

The increase in U.S. exports of telecommunications equipment was seen in all of the industry sectors. Total U.S. exports of all types of telecommunications increased from $748.5 million in 1978 to approximately $1.3 billion in 1983, or by an average rate of 12.4 percent annually. Despite this increase, U.S. exports as a share of foreign consumption in recent years did not exceed 4 percent, rising from 3.0 percent in 1978 to 3.7 percent in 1983.

According to reporting U.S. producers, price was less important than other factors affecting U.S. exports sales, particularly those sales to foreign telephone companies. Reportedly, such orders were guided according to the relationships between the PTT or telephone company and the manufacturer. According to most sources, the most significant factors determining contract awards were quality and domestic content. The domestic U.S. companies which have gained shares of foreign markets have generally followed one of two strategies--establishing subsidiary manufacturing plants in the foreign country and exporting to markets where there are no domestic producers.

- o Demand for telecommunications equipment increased by an average annual rate ranging from 3.5 to 15.9 percent in eight major foreign countries during 1978-83.

Aggregate consumption of these products in eight major markets, as estimated by the Commission, increased from $14.9 billion in 1978 to $21.6 billion in 1983, or by 45 percent. The fastest growing market during 1978-83 was the United Kingdom, where consumption increased from approximately $1.4 billion in 1978 to $3.0 billion in 1983, or by 15.9 percent per year. The following tabulation shows foreign consumption of telecommunications equipment, by countries, for 1978 and 1983 and the average annual rate of growth throughout that period:

Country	1978	1983	Average annual rate of increase
	Million dollars		Percent
West Germany	4,990.5	6,901.9	6.7
Japan	3,482.6	4,988.4	7.4
France	2,234.0	3,120.0	6.9
United Kingdom	1,442.3	3,019.2	15.9
Italy	1,103.0	1,471.9	5.9
Canada	902.5	1,224.4	5.9
Netherlands	455.9	541.8	3.5
Sweden	227.2	321.9	7.2
All other	9,904.7	14,392.3	7.8

2. THE U.S. MARKET FOR TELECOMMUNICATIONS EQUIPMENT

- o U.S. consumption of telecommunications equipment experienced an average annual growth of 13 percent during 1978-83, resulting in an increased share of world consumption.

The value of apparent U.S. consumption of telecommunications equipment increased by nearly 85 percent during 1978-83, from $10.0 billion to $18.5 billion. U.S. consumption as a share of world consumption rose from 28.8 percent in 1978 to 33.9 percent in 1983.

- o Although the U.S. market continued to be served principally by U.S. producers, import penetration increased in all telecommunications equipment categories from 3.0 percent in 1978 to 10.8 percent in 1983.

Market penetration by imports in 1983 varied by type of equipment from a low of 0.9 percent for switching apparatus to a high of 18.7 percent for customer premises equipment. Import penetration, by types of equipment, for the years 1978 and 1983 is shown in the following tabulation (in percent):

Product	1978	1983
Transmission equipment	3.6	6.4
Switching apparatus	.5	.9
Customer premises equipment	5.0	18.7
Cable, wire, and lightguide	.5	2.7
Average	3.0	10.8

- U.S. products enjoyed a strong competitive advantage over imports in the U.S. market, with few exceptions, generally because of the historic supplier relationships.

U.S. producers were unanimous in stating that U.S.-made products have an overall competitive advantage over imports in the U.S. market, with the exception of key systems switching equipment from Japan and private branch exchanges from Canada. The most commonly cited reason for this advantage was the historical "captive" supplier relationship; but availability, compatibility with existing systems, and shorter delivery times were also frequently cited by respondents.

- In those cases where imports were purchased instead of U.S. products, lower price and availability were the most frequently cited reasons.

Most purchases of foreign products were of telephone sets and key systems. Purchasers of these products and cable, wire, and lightguide reported lower price and availability as the major purchasing determinants. A lesser number of purchasers cited superior design and service as the reasons for purchasing foreign transmission equipment and central office switching equipment.

3. NOMENCLATURE REQUIRED FOR MONITORING CURRENT AND FUTURE TRADE IN TELECOMMUNICATIONS EQUIPMENT

- The current U.S. trade nomenclature is inadequate to monitor trade in telecommunications equipment.

The provisions in the Tariff Schedules of the United States Annotated (TSUSA) and Schedule B are outdated insofar as monitoring trade in telecommunications products currently classifiable under provisions relating to articles such as computer-type and radio-type products. Many of these provisions date back to 1963, the year in which the Tariff Schedules of the United States (TSUS) became law and have lost trade-monitoring effectiveness as a result of the rapid technological development within the industry. The broad categories for telephone and telegraph apparatus are the only ones consistently monitored in the last 20 years.

- o The Commission recommends the expansion and redefinition of the import and export schedules to identify important telecommunications trade categories.

The Commission identified 16 provisions in the 1984 TSUSA, which contained a substantial value of telecommunications equipment. The Commission recommended that these 16 items be expanded to 38 redefined provisions in order to more accurately monitor U.S. imports of telecommunications equipment. In Schedule B, the Commission recommended that the current 6 export provisions be expanded to 15 items to monitor export trade in these products. The proposed import/export data collection mechanism should provide a more accurate trade data base upon which to monitor import penetration levels.

4. THE FUTURE OF THE U.S. TELECOMMUNICATIONS MARKET AND ITS IMPACT ON TELECOMMUNICATION TRADE 1/

A. The Baseline Scenario

- o The Baseline Scenario indicates that consumption would increase at an average annual rate of about 5.9 percent in the short term and 4.3 percent in the long term.

If the future of the telecommunications equipment market were determined solely on the basis of its past performance, growth in consumption would be expected to increase from $18.5 billion in 1983 to $24.6 billion in 1988 or by 6 percent annually, and from $24.6 billion to $30.3 billion in 1993, or by 4.5 percent annually. The trend in decreasing annual growth rates would apply to shipments, exports, and imports as well, as shown below:

1/ The future telecommunications equipment market in the United States for 1984-88 and 1989-93 was depicted in three scenarios, each through the use of different methods of projection. Scenario 1, the Baseline Scenario, extends historical data from 1967-83 through 1993 by creating a linear model using regression techniques. This scenario assumes no divestiture by A.T. & T. of its 22 operating companies but does include regulatory changes which occurred during the period. Scenario 2, the Respondent Scenario, extends historical data by applying the aggregated judgment of the responding industry officials to what will occur in U.S. consumption, shipments, exports, and imports through 1993. Scenario 3, the Open Market Scenario, applies the judgement of the Commission to historical data, taking into account projections from the private sector, to predict the elements of U.S. consumption in 1988 and 1993. All data are in constant 1983 dollars.

Period	Producers' shipments	Exports	Imports	Apparent consumption
		Percent		
1983-88	5.3	5.1	9.8	5.9
1988-93	4.0	5.0	6.3	4.3
		Millions of 1983 dollars		
1983	17,834	1,342	1,990	18,483
1988	23,129	1,722	3,172	24,579
1993	28,187	2,202	4,297	30,282

- o Under the Baseline Scenario, import penetration would rise in both the short and long term, and the ratio of exports to shipments would fall slightly in the short term and then rise slightly over the long term.

Under this scenario, the higher average growth in imports compared with that for consumption and shipments would result in an increase of import penetration from 10.8 percent in 1983 to 12.9 percent in 1988 and 14.2 percent in 1993. Exports as a share of shipments would vary only slightly, declining from 7.5 percent in 1983 to 7.4 percent in 1988 and then rising to 7.8 percent in 1993.

- o Transmission equipment would experience a short-term growth in consumption of approximately 6.7 percent annually, whereas long-term growth would slow to a 4.7-percent annual rate.

The market for transmission equipment would show trends similar to the industry as a whole; the growth in consumption and shipments would be relatively slow in the long term compared with those aspects in earlier years. Consumption is expected to grow from $5.2 billion in 1983 to $7.1 billion in 1988, but will increase to only $9.0 billion by 1993. The increase in imports would be less than that of consumption throughout the period. As a result, import penetration would be expected to decline in both periods. The projected average annual growth in shipments, exports, imports, and consumption in the transmission equipment sector, for both the short term and long term, are shown in the following tabulation:

Period	Producers' shipments	Exports	Imports	Apparent consumption
		Percent		
1983-88---	6.7	4.9	5.8	6.7
1988-93---	4.8	4.9	4.3	4.7
		Millions of 1983 dollars		
1983------	4,970	148	332	5,154
1988-----	6,867	188	440	7,119
1993------	8,671	239	544	8,976

o Switching equipment will be the slowest growing sector in the telecommunications industry according to historical growth patterns.

The switching equipment market should show the lowest growth of all the sectors of the telecommunications market, and this growth is expected to slow in the long term, increasing from $3.1 billion in 1983 to $3.7 billion in 1988 and $4.2 billion in 1993. Compared with the growth in consumption, the growth in imports is expected to be high through 1993. However, since their value relative to consumption should remain small, import penetration would increase only from 0.9 percent in 1983 to 2 percent in 1993. The projected average annual growth for the switching equipment sector, for short term and long term, are shown in the following tabulation:

Period	Producers' shipments	Exports	Imports	Apparent consumption
		Percent		
1983-88---	3.8	5.8	14.8	3.5
1988-93-	3.1	5.6	8.0	2.7
		Millions of 1983 dollars		
1983------	3,593	534	28	3,086
1988------	4,319	708	55	3,666
1993------	5,031	928	81	4,184

o The Baseline Scenario predicts both a high, though declining, growth rate in imports of customer premises equipment and high import penetration in the U.S. market.

Both consumption and shipments of customer premises equipment are expected to show low growth in the short term which should slow further in the long term. Consumption is expected to increase from $8.5 billion in 1983 to

$14.2 billion in 1993. The growth in imports should decline in the long term as well but is expected to remain above that of consumption through 1993. Consequently, the level of import penetration should increase in the short and long term, from 18.7 percent in 1983 to 22.7 percent in 1988 and 25.0 percent in 1993. The projected average annual rates of growth in shipments, exports, imports, and consumption for the customer premises equipment sector for both the short term and long term are shown in the following tabulation:

Period	Producers' shipments	Exports	Imports	Apparent consumption
	Percent			
1983-88	5.1	4.5	10.4	6.2
1988-93	3.9	4.6	6.5	4.4
	Millions of 1983 dollars			
1983	7,392	495	1,582	8,479
1988	9,469	618	2,593	11,444
1993	11,442	774	3,556	14,224

- o Both consumption and imports of cable, wire, and lightguide would show declining growth from short term to the long term, but with increased import penetration.

The projected average annual rate of growth of shipments, imports, exports, and consumption in the cable, wire, and lightguide sector is expected to slow in the short and long term. The value of consumption is expected to grow from $1.9 billion in 1981 to $2.5 billion in 1988 and $2.9 billion in 1993, as shown in the following tabulation:

Period	Producers' shipments	Exports	Imports	Apparent consumption
	Percent			
1983-88	5.1	4.5	10.4	6.2
1988-93	3.9	4.6	6.5	4.4
	Millions of 1983 dollars			
1983	1,879	165	49	1,763
1988	2,474	208	84	2,350
1993	3,043	261	116	2,898

The higher growth rates for imports, compared with that for consumption, would result in an increase in import penetration from 2.8 to 3.6 percent in 1988 and 4.0 percent in 1993.

B. The Respondent Scenario

- o The telecommunications industry is expected to show little or no growth during 1983-93 under the Respondent Scenario.

According to data supplied by respondents to the Commission's questionnaires, the telecommunications industry would grow by only 6 percent during 1983-93, or by less than 1 percent per year through 1993; however, in view of the continuing technological advances in the industry, coupled with insufficient response by industry to the Commission's questionnaires, it is possible that a much higher growth rate could be achieved. Under the Respondent Scenario, demand for transmission equipment would increase by 39 percent, and that for switching apparatus would increase by 27 percent from 1983 to 1993. During the same period, demand for customer premises equipment would decrease by 13 percent, and that for cable, wire, and lightguide would decrease by 25 percent.

C. The Open Market Scenario

- o The Open Market Scenario indicates an average annual growth in consumption of more than 8 percent in the telecommunications equipment market through 1993.

The U.S. market for telecommunications equipment is expected by the Commission to increase by more than 8 percent per year through 1993, (from $18.5 billion in 1983 to $41.3 billion in 1993) primarily as a result of a continuation in technological advances. Long product life cycles of the past are now, in many cases, being shortened all the way up to the point of obsolescence upon installation. Customer demands for expanded services provided by the latest technology are expected to force more rapid replacement schedules for both private and public networks. The following tabulation shows the average annual growth in shipments, exports, imports, and consumption of telecommunications in both the short and long terms:

Period	Producers' shipments	Exports	Imports	Apparent consumption
	Percent			
1983-88---	7.8	6.6	10.1	8.2
1988-93---	8.1	6.0	11.0	8.6
	Millions of 1983 dollars			
1983------	17,834	1,342	1,990	18,482
1988------	25,976	1,845	3,226	27,357
1993------	38,349	2,467	5,428	41,310

- Import penetration of the U.S. telecommunications market is expected to increase to 13.1 percent in 1993, and exports as a share of shipments could decrease.

Imports' share of the U.S. telecommunications market is expected to increase from 10.8 percent in 1983 to 13.1 percent in 1993, and U.S. exports as a share of U.S. shipments are expected to decrease from 7.5 percent in 1983 to 6.4 percent in 1993. The primary factor attributed to the changes in both imports and exports is that the domestically produced equipment cannot effectively compete with the lower priced foreign products in certain market segments, primarily, customer premises equipment.

- U.S. demand for transmission equipment could increase by more than 8 percent per year through 1993 and imports, primarily from Japan, are expected to account for an increasing share of the U.S. domestic market.

The U.S. demand for transmission equipment would increase steadily during 1983-93, from an average annual growth rate of 8.2 percent in the short term (from $5.2 billion in 1983 to $7.6 billion in 1988) to 8.9 percent in the long term (from $7.6 billion to $11.7 billion in 1993), primarily as a result of bypass (the use of private telecommunications networks that operate independently of the telephone companies). Much of the increase in demand could be satisfied by imports of transmission equipment from European countries and Japan and other Far East countries, because consumption would increase faster than shipments. The following tabulation shows the average annual growth in shipments, imports, exports, and consumption for transmission equipment in both the short and long terms:

Period	Producers' shipments	Exports	Imports	Apparent consumption
	Percent			
1983-88---	8.0	7.7	9.6	8.2
1988-93---	8.6	7.6	12.2	8.9
	Millions of 1983 dollars			
1983------	4,970	148	332	5,154
1988------	7,318	215	525	7,628
1993------	11,057	310	934	11,681

- Demand for switching equipment, which would increase by 6.9 percent per year in the short term and 7.6 percent per year in the long term, is expected to be satisfied by domestic shipments.

Demand for switching equipment is expected to increase at a slower rate than demand for other sectors of the telecommunications industry, since most of the future market is for replacement equipment. Consumption of this

equipment is expected to increase from $3.1 billion in 1983 to $6.2 billion in 1993. Much of this demand would be satisfied by domestic production, since purchasers are less likely to change suppliers because the costs would be uneconomical. Therefore, the import penetration ratio is expected to increase only from 1 percent in 1983 to 2 percent in 1993. The following tabulation shows the average annual growth in shipments, exports, imports, and consumption for switching equipment in the short and long terms:

Period	Producers' shipments	Exports	Imports	Apparent consumption
		Percent		
1983-88	6.8	7.2	15.2	6.9
1988-93	7.2	5.6	17.2	7.6
		Millions of 1983 dollars		
1983	3,593	534	28	3,086
1988	4,999	755	56	4,300
1993	7,061	986	124	6,200

- Customer premises equipment demand would experience average annual growth of approximately 9 percent through 1993 as consumers continue to purchase terminal equipment.

As a result of the increase in private telephone networks in operation and customer purchases of terminal equipment such as telephone sets, data display monitors, and personal computers, demand for customer premises equipment would show a steady average annual growth of 8.8 percent in the short term and 9 percent in the long term, or from $8.5 billion in 1983 to $19.9 billion in 1993. Domestically produced equipment is expected to be better able to satisfy most of the demand as U.S. firms become increasingly competitive with foreign producers and consumers evaluate products on the basis of quality instead of price. The following tabulation shows the average annual growth in shipments, exports, imports, and consumption for customer premises equipment in the short and long terms:

Period	Producers' shipments	Exports	Imports	Apparent consumption
		Percent		
1983-88	7.4	4.6	10.1	8.8
1988-93	7.6	5.9	10.5	9.0
		Millions of 1983 dollars		
1983	7,392	495	[illegible]	[illegible]
1988	10,987	620	2,562	12,929
1993	16,524	825	4,230	19,929

Import penetration of the U.S. market is expected to continue through 1993, however, at a much slower pace than previously experienced. Import penetration of the U.S. market could increase from the record high of 18.7 percent in 1983 to 21.2 percent by 1993.

- o U.S. shipments, exports, imports, and consumption of cable, wire, and lightguide would increase through 1993; import penetration from offshore production facilities may increase by 30 percent by 1993.

U.S. shipments, exports, imports, and consumption of cable, wire, and lightguide would increase through 1993 as shown in the following tabulation for the short and long terms:

Period	Producers' shipments	Exports	Imports	Apparent consumption
		Percent		
1983-88---	7.3	9.1	11.3	7.2
1988-93---	6.7	5.4	11.0	7.0
		Millions of 1983 dollars		
1983------	1,879	165	49	1,763
1988------	2,672	255	83	2,500
1993------	3,692	332	140	3,500

The value of consumption is expected to grow from $1.8 billion in 1983 to $2.5 billion in 1988 before increasing to $3.5 billion in 1993. This is primarily the result of the replacement of copper cable with imports of fiber optic cable from Japan and Western Europe. As the import market for fiber optics becomes more competitive, Japanese manufacturers could move their production facilities offshore in order to take advantage of lower cost labor in countries such as the Republic of Korea and Taiwan. The import penetration of the U.S. market could then increase from 2.8 percent in 1983 to 4.0 percent by 1993.

SELECTED TELECOMMUNICATIONS APPARATUS ADDRESSED

Telecommunications as used in this report means the provision of voice, data, or record point-to-point communications. Not included in this definition are entertainment broadcast services. Telecommunications networks may be owned and operated as common carriers for use by the public at large (telephone companies) or may be privately operated for internal communications for the sole benefit of the owner. Although the original telecommunications systems were wire-line connected, there is now no technological restriction on the method of transmission. Apparatus using conducted electric waves, radio (electromagnetic radiated) waves, or light waves is included. Apparatus such as construction equipment, poles, general-purpose and portable test equipment, paper or consumable products, tools, bit and piece parts, general hardware, and electronic components are not included.

Telecommunications apparatus may be divided into four separate (but not always distinct) categories, transmission equipment, switching apparatus, customer premises equipment (CPE), and cable, wire, and lightguide. Until recently, this apparatus, except for customer premises equipment, was located on the premises of telephone and telegraph companies. However, due to the emergence of large, private networks whose use is not available to the public and which are owned and operated by private companies for their own internal communications, some equipment is now sold to other than telephone, telegraph, and other common carriers.

Transmission Equipment

Transmission equipment functions to forward information including telephone messages, data, telegraph signals, and television signals from one point to another. The transmission may be by radiation (transmitted freely in space or guided in pipes or fibers) or by conduction (through wires or cables.)

Fixed station radio apparatus is used for the transmission and reception of information principally between switching centers. The radio transmission apparatus may be designed for direct transmission and reception or may be of a relay type where transmitters and receivers are employed to amplify the signals over longer distances. Satellites and their earth station reception and transmission apparatus are included in this subcategory. Auxiliary or ancillary equipment such as antennas, multiplexers, radio frequency (RF) amplifiers, exciters, filters, and any other radio apparatus intended for fixed station service are also included, along with any parts, components, or combinations of such radio apparatus.

Carrier current line transmission apparatus is that transmission apparatus used to signal messages over wires or cables by conducted, rather than radiated, electric waves. The distinction between radio apparatus and carrier current apparatus may be arbitrary in certain instances, since much of the equipment can be used for either radio or carrier current applications. The principal distinction, however, is operating frequency, with the lower frequency apparatus being for carrier current use. Components, parts, and auxiliary apparatus associated with carrier line current transmission systems are included in this subcategory.

Light waves 1/ are electromagnetic (radio) waves with frequencies in the visible and infrared frequency spectrum. Such waves may be transmitted directly through air or vacuum, such as is common in radio transmission, or may be transmitted through very thin fibers of glass (or other material such as plastic) in so-called fiber optic systems. Lightwave transmission apparatus is that equipment used to generate, detect, switch, combine, amplify, or otherwise manipulate lightwaves for communications purposes. Lightwave fibers are covered in the cable and wire subcategory. Lightwave instrumentation for measurement 2/ purposes is excluded.

Some of the principal products included in transmission equipment are as follows:

- Transmission and reception apparatus (for conducted, radio, or light waves)
- Multiplexers
- Amplifiers
- Expanders
- Translators
- Repeaters
- Transponders
- Synthesizers
- Extenders
- Communications satellites
- Antennas
- Carrier equipment
- Modulators
- Combiners
- Companders
- Cancelors
- Microwave links
- Equalization equipment
- Exciters

Switching Apparatus

Switching equipment is defined as that equipment designed to permit the connection of any terminals or groups of terminals to any other terminals or groups of terminals. Such auxiliary and ancillary apparatus as is necessary for traffic management, network control, and accounting is included. Private branch exchanges and key system-switching equipment are included and illustrated with customer premises equipment in this report. Switching products, accessories, or ancillary equipment covered are not only the traditional metallic-connection- type step-by-step and crossbar switches, but also the more modern digital switches. Digital switching apparatus resembles and uses many of the same components, subassemblies, and parts as digital computers and data-processing equipment. Computers, data-processing machines, and other digital apparatus are used to control switches, measure traffic, account for tolls, implement troubleshooting and maintenance, and measure performance.

A subcategory selected by the Commission for demonstrating trade impact is class 5 central office switches. These switches are usually the last in the chain of central office equipment and distribute traffic to customer premises equipment. Class 5 central office switches vary in size from a few hundred lines to hundreds of thousands of lines, depending on the end office demands for distribution to customers. The smaller switches can be made with

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1/ Light waves are considered to be electromagnetic radio waves and differ from radio waves in frequency only.

2/ Such as temperature, pressure, strain, or acceleration detectors.

similar inputs as required for private branch exchanges (PBX's). 1/ An illustration of the use of central office switches (local office) is shown in figure 1.

Customer Premises Equipment 2/

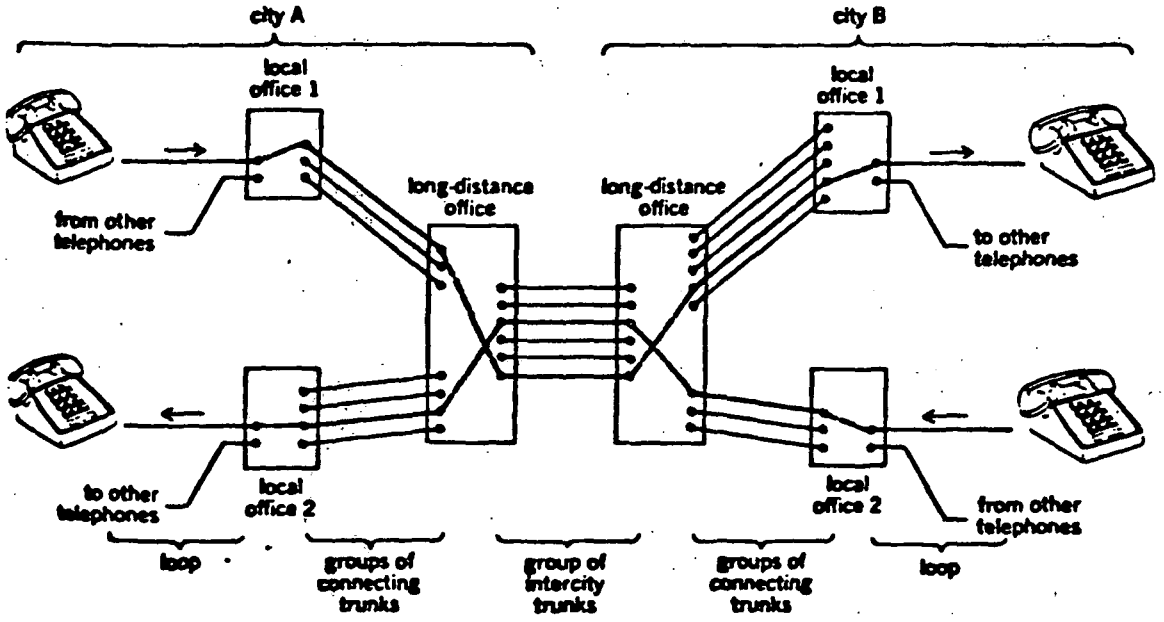
CPE may encompass all types of information switching, transmission, and termination apparatus. Such electronic products are usually designed to be located in facilities not owned by the carrier itself, and include, but are not limited to, all products and equipment required to be registered by the Federal Communications Commission (FCC). This category consists principally of terminal equipment and certain switching equipment and may be wire-line type or radio type.

Wire line type is customer premises designed principally to be connected to the network by wire. PBX's of all types (electronic or electromechanical) are included whether or not such apparatus is sold to or used by specialized or other common carriers or for whatever purpose used (intercommunication, interconnection, and local area networks). Key terminal units, power supplies, and all other apparatus used with multiline key systems are wire-line-type equipment as well as multiline telephones used in key telephone systems whether or not in combination with other telephone data terminal apparatus. All other types of wire-connected telephone instruments whether or not in combination with other products such as radios, calculators, cigarette lighters, and tape recorders are also included. Data terminals are defined as those machines, instruments, and other devices used to terminate telecommunications networks for any purpose except voice communications and include terminals with or without keyboards principally employing cathode ray tubes (CRT's) for the display of information received on the networks, all terminals producing a permanent record and designed to be connected by wire to the network, and all other data terminals designed for display (only) or permanent records. All other apparatus used to terminate the network and act as an interface for other electronic apparatus, such as (but not limited to) modems, universal asynchronous receiver transmitters (UARTS), acoustic couplers, analogue to digital and digital to analogue converters, etc., are in this subcategory. Radio type CPE employs radiated radio waves as a principal design feature of the terminal apparatus. Telephone instruments using radio signals to convert the users handset to a wire line terminating device (cordless headset telephones) are an example. All apparatus designed to act as an extension of the telephone network, whether hand portable or vehicular, are included. Cellular and conventional mobile radio telephones are principal examples of mobile radio apparatus.

1/ A glossary of abbreviations, acronyms, and initialisms is contained in appendix D.

2/ Terminal equipment is sometimes used to describe customer premises equipment. Such usage, however, connotes too narrow a range of apparatus which is now found outside the telephone or common carriers' facilities.

Figure 1.--Basic telephone system.



Source: AT&T.

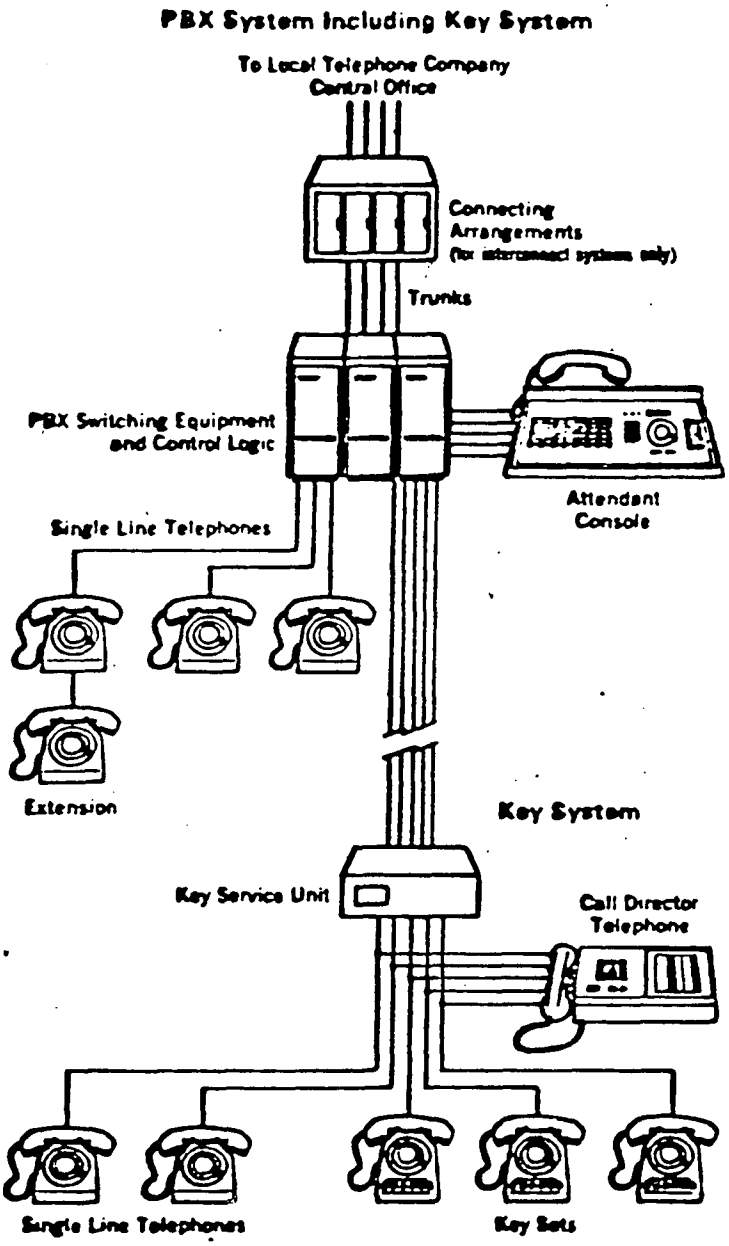
Included in customer premises equipment are the following:

- Telephone instruments (including combinations with dialers, redialers, radios, clocks, calculators, with or without amplifiers or displays of any kind, and the like)
- Modems
- Acoustic couplers
- Facsimile machines
- Display terminals
- Teleprinters
- Teletypewriters
- Graphics terminals
- Key systems
- Converters
- Sensors and pickups for telemetering, alarming, and remote metering
- Scramblers
- Decorders
- Digital to analog and analog to digital converters
- Codes
- UARTS
- Access dialers

Certain of the products selected for comparison in this report, with the notable exception of data display terminals, 1/ are shown in figure 2. The PBX is connected through a trunk(s) to a central office. The PBX routes the signal incoming from the central office to the various terminal equipment. The telephone set is the most frequently used terminal. However, telephone sets are increasingly being used in conjunction with a modem to forward data to and from a data display terminal which provides a visual display of received information. Data display terminals with modems incorporated are connected directly to the network. Key system-switching equipment usually receives several lines which are directed in accordance with the incoming signal to one or more terminals. Multiline telephone sets (key sets) are often used with key system-switching equipment to provide flexibility by allowing several incoming lines to terminate on single (or several) telephones.

1/ Data display terminals are an example of the type of equipment considered to be telecommunications apparatus dependent on its end use. Personal computers are another example. Many data display terminals are not connected to the telephone and telegraph network; however, an increasing number are. Some manufacturers provide data display terminals with modems incorporated; some producers provide a separate modem, if requested.

Figure 2.--Telephones, key system, and private branch exchange.



Source: SRI International, Menlo Park, Calif.

Cable, Wire, and Lightguide

Cable, wire, and lightguide are used as the conductors or conduits in the transmission of voice, data, and record between terminals, switches, and certain transmission apparatus when the link is not made by radiated radio waves. Cable, wire, and lightguide are frequently gathered in large bundles, particularly between switching centers. As the distance from a switching center toward customer premises increases, the bundles became smaller. Usually, only a few wires enter a residence. Lightguide is now used principally between large switching centers. 1/

TARIFF TREATMENT

Tariff History

Telecommunications equipment per se is not separately provided for in the current Tariff Schedules of the United States (TSUS). However, when the TSUS became effective in August 1963, provision for such equipment was made in TSUS superior headings, which included electrical telegraph and telephone apparatus and radiotelephonic and radiotelegraphic transmission and reception apparatus. 2/ With the advent of the computer, lightwave transmission, and the use of the communications network for data transmission and reception, the interpretive provisions of the TSUS proved to be too restrictive to cover all of the different types of equipment entering into commerce. Telecommunications equipment now enters the United States under various rate line items of the TSUS, including those for office machines and optical lens. It is likely that future advances in technology will cause yet-to-be traded telecommunications products to be imported under other TSUS items as well.

The most-favored-nation (MFN) rates of duty (col. 1) applicable to imports of telecommunications equipment range from free to 13.1 percent ad valorem (table 1). Under an agreement reached in the Tokyo round of the Multilateral Trade Negotiations (MTN), certain rates will undergo annual staged reductions through January 1, 1987. On that date, the MFN duty rates will range from free to 8.4 percent ad valorem; these final staged reductions are those currently applicable to imports from certain least developed developing countries (LDDC's). The column 2 rates of duty applicable to imports of all types of telecommunications equipment from designated Communist countries range from 35 to 85 percent ad valorem. In addition, certain telecommunications equipment has been designated for duty-free treatment when imported under the Generalized System of Preferences (GSP) from certain beneficiary developing countries, subject to the "competitive need limitations" covered under title V of the Trade Act of 1974. 3/ During

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1/ There are experimental programs in foreign countries where lightguide is used for the local loop (that is, between the home and central office).

2/ The use of the terms telephone and telegraph can be traced to the tariff schedule of the 1890's.

3/ Duty-free imports entered under a TSUS item from a beneficiary developing country are limited to a percentage of the U.S. gross national product and to 50 percent of the appraised value of imports. Eligibility also requires at least 35 percent of the appraised value of the TSUS item eligible under the GSP be added in the beneficiary developing countries.

Table 1.—Telecommunications equipment and parts: U.S. rates of duty, present and negotiated, and GSP and LDDC status

(Percent ad valorem)

TSUS item 1/	Description	Present col. 1 rate of duty 2/	Negotiated col. 1 rate of duty 3/	Present col. 2 rate of duty 4/	LDDC 5/
676.15(pt.)A	Accounting, computing, and other data processing machines.	4.5%	3.9%	35%	3.9%
676.30(pt.)A*	Office machines not specially provided for	4.2%	3.7%	35%	3.7%
676.52(pt.)A*	Parts of office machines other than typewriters.	4.5%	3.9%	35%	3.9%
684.62A*,	Telephonic apparatus and instruments and parts thereof.	8.5%	6/	35%	7/
684.64A	Telegraphic apparatus (including printing and typewriting).	5.6%	4.7%	35%	4.7%
685.11(pt.)	Data display terminals imported as color television receivers.	5.0%	6/	35%	7/
685.24(pt.)A*	Certain radio receivers and pagers	7.7%	6.0%	35%	6.0%
685.29(pt.)A*	Certain radio transmission and reception apparatus.	6.0%	6/	35%	7/
685.40(pt.)A*	Telephone answering machines	4.5%	3.9%	35%	3.9%
688.15(pt.)A*	Insulated conductors with fittings	5.8%	5.3%	35%	5.3%
688.43(pt.)A*	Electrical articles not specially provided for.	4.5%	3.9%	35%	3.9%
708.09(pt.)A	Lightguide unmounted	13.1%	8.4%	85%	8.4%
708.29(pt.)A	Lightguide, mounted	13.1%	8.4%	65%	8.4%

1/ The designation "A" or "A*" indicates that the item is currently designed as an eligible article for duty-free treatment under the U.S. Generalized System of Preferences (GSP). "A" indicates that all beneficiary developing countries are eligible for GSP. "A*" indicates that certain of these countries, specified in general headnote 3(c) of the Tariff Schedules of the United States Annotated, are not eligible. The GSP, under title V of the Trade Act of 1974, provides duty-free treatment of specified eligible articles imported directly from designated beneficiary developing countries. The GSP, implemented by Executive Order No. 11888 of Nov. 24, 1975, applies to merchandise imported on or after Jan. 1, 1976, and is scheduled to remain in effect under Jan. 4, 1985.

2/ Rate in effect on Jan. 1, 1984. The rates of duty in col. 1 are most-favored-nation (MFN) rates, and are applicable to imported products from all countries except those Communist countries and areas enumerated in general headnote 3(f) of the TSUSA. However, such rates would not apply to products of developing countries which are granted preferential tariff treatment under the GSP or under the "LDDC" rate of duty column.

3/ Final rate negotiated under the Tokyo round of the Multilateral Trade Negotiations to be achieved through 8 annual staged duty reductions effective Jan. 1, 1987.

4/ The rates of duty in col. 2 apply to imported products from those Communist countries and areas enumerated in general headnote 3(f) of the TSUSA.

5/ The rates of duty in the rate of duty column "LDDC" are preferential rates (reflecting the full U.S. most-favored-nation (MFN) concessions rate for a particular item without staging) and are applicable to products of the least developed developing countries designated in general headnote 3(d) of the TSUSA which are not granted duty-free treatment under the GSP.

6/ The column 1 rate was not reduced under the Tokyo round of the Multilateral Trade Negotiations.

7/ Not applicable in that the rate is the same as col. 1 rate.

1979-84, imports from certain beneficiary developing countries have been declared ineligible for GSP duty-free treatment, as shown in table 2; these countries became ineligible for duty-free treatment with respect to all products classified under the designated TSUS number, including telecommunications equipment.

The rates of duty applicable to imports of certain U.S. telecommunications equipment entering the customs territory of major U.S. trading partners are shown in table 3. The rates range from 4.25 percent ad valorem (Sweden) to 17.5 percent ad valorem (Canada).

Discussion of Rate Changes

The United States reduced the rates of duty applicable to imports of telecommunications equipment on all products except three as a result of the Tokyo round of Trade Negotiations. The first exception, data display terminals, when imported as color television receivers, 1/ were subject to an Orderly Marketing Agreement, and the second was Citizens Band radio transceivers 2/ which are included in imports of certain radio transmission and reception apparatus subject to an elevated rate of duty occasioned by injury to the U.S. industry at the time of the negotiations. The third exception was telephone apparatus and instruments and parts thereof which were linked with an agreement under the Government Procurement Code 3/ which would open all countries' markets to foreign-produced telecommunications equipment. That agreement has not yet been reached, and the United States has not lowered the linked rate. However, the United States and Japan, subsequent to the Tokyo round, achieved some relaxation of market restrictions imposed by Japan on imports from the United States.

Only Canada and the European Community (EC), among the traders with the potential for sizable mutual trade with the United States in telecommunications equipment, failed to reduce their duty rates on all telecommunications equipment. Canada maintained its rate of 17.5 percent ad valorem, and the EC maintained its rate of 7.5 percent ad valorem. These rates are unlikely to be changed absent further negotiations among trading partners. Such negotiations, leading to more signatories to the Government Procurement Code or similar agreements, could result in the relaxation of trade restrictions on telecommunications equipment.

Nomenclature Required for Monitoring Current and Future U.S. Trade in Telecommunications Equipment

In response to the request by the Senate Finance Committee (see Preface), current and proposed nomenclature for U.S. imports and the recommended changes in nomenclature for the TSUS and for the Schedule B were provided to the

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1/ Color television receivers are not considered telecommunications equipment for the purpose of this report.

2/ Citizens Band radio transceivers are not considered telecommunication equipment for the purpose of this report.

3/ One of several agreements reached under the Tokyo round of the MTN under the General Agreement on Tariffs and Trade.

Table 2.—Certain telecommunications equipment: Countries ineligible for duty-free treatment under the GSP, by product, 1979-83 1/

TSUS item	Description	Year					
		1979	1980	1981	1982	1983	1984
676.30A*	Other office machines	none	none	none	none		Taiwan
676.52(pt.) A*	Parts of office machines other than typewriters.	Hong Kong Mexico	Hong Kong Mexico	Hong Kong Mexico	Hong Kong Mexico	Hong Kong Mexico Singapore Taiwan	Hong Kong Mexico Singapore Taiwan
684.62A*	Telephone apparatus	none	none	none	none	none	Hong Kong Taiwan
685.24(pt.) A*	Certain radio, receivers and pagers.	Hong Kong Korea Singapore Taiwan	Hong Kong Korea Singapore Taiwan	Hong Kong Korea Singapore Taiwan	Hong Kong Korea Singapore Taiwan	Hong Kong Korea Singapore Taiwan	Hong Kong Korea Singapore Taiwan
685.29(pt.) A*	Certain radio transmission and reception apparatus.	None	None	Singapore	None	Taiwan	Hong Kong Korea Taiwan
685.40(pt.) A*	Telephone answering machines—	Korea	Taiwan	Taiwan	Taiwan	Korea Taiwan	Korea Taiwan
688.15(pt.) A*	Insulated conductors with fittings.	None	Mexico	Mexico	Mexico	Mexico	Mexico
688.43(pt.) A*	Electrical articles not specially provided for.	Hong Kong	Hong Kong	Hong Kong	Hong Kong	Hong Kong	Hong Kong Taiwan

1/ Duty-free treatment under the GSP extends from March 31 to March 30 of the succeeding year, every year except leap year, when it extends from March 30 to March 29 of the succeeding year.

Source: Tariff Schedules of the United States Annotated, 1979-84 editions.

Table 3.--Certain telecommunications equipment: Rates of duty, present and negotiated, applied to imports from the United States by major trading partners.

(Percent ad valorem)

Item no.	Country and product description	Present rate of duty	Concession rate of duty
	Canada:		
44506-1	Electric telegraph apparatus and complete parts thereof.	12.9%	10.2%
44508-1	Electric telephone apparatus and complete parts thereof.	17.5%	1/ 10.2%
	Japan:		
85.13	Apparatus for carrier current line systems	4.5%	3.6%
	Electronical telephonic and telegraphic switchboards and exchanges.	9.2%	5.7%
	Telephonic switchboards and exchanges other than electronic, other telephonic apparatus and parts of the foregoing.	5.4%	4.2%
	Sweden:		
85.13	Electrical line telephonic and telegraphic apparatus.	4.25%	3.8%
	Economic Community:		
85.13	Electrical line telephonic and telegraphic apparatus:		
	Apparatus for carrier current line systems	5.3%	4.6%
	Other	7.5%	1/ 5.1%

1/ The concession conditioned to the effective implementation of United States concessions on TSUS item 684.62. No concession has been made because all major Governments have not subscribed to the Government Procurement Code.

Source: Geneva (1979) Protocol to the General Agreements on Tariffs and Trade.

Chairman, Committee on Finance, U.S. Senate, on February 29, 1984. Subsequently, on March 26, 1984, the recommendation was modified at the request of Committee staff to include certain communications satellites and to provide for preentry registration of imports of telecommunications equipment. The information provided to the Committee and a comparison of the pertinent provisions in the Tariff Schedules of the United States Annotated (1984) and Schedule B to the proposed amended schedules is shown in appendix E. 1/

The tariff rate line items identified in the 1984 tariff schedules containing telecommunications equipment totaled 16. In order to monitor import data more accurately, those 16 items have been expanded to 38 tariff rate line provisions in the Commission's recommendations for proposed amendments. The principal additions are in the areas of office computers and radio apparatus. 2/ In addition, to more accurately reflect data on U.S. exports and to accord harmony with U.S. import statistics, six statistical reporting provisions in Schedule B are recommended to be expanded to 15 items in the proposed amendments.

Foreign Activity

In 1979, as part of the Multilateral Trade Negotiations, all of the countries with major telecommunications industries, i.e., Canada, Sweden, France, the Netherlands, the United Kingdom, West Germany, Italy, and Japan negotiated the Agreement on Technical Barriers to Trade. 3/ This agreement established procedures for setting product standards of most types of equipment, including telecommunications equipment. In addition, as subscribers to the International Telecommunications Union's (ITU's) International Telegraph and Telephone Consultative Committee (CCITT) standards, these countries agreed to standardize technical specifications for the interconnection of telecommunications equipment. 4/ However, these common standards have yet to be observed. In January 1984, members of the European Conference of Postal and Telecommunications Administrations (a 26-member organization of European Post, Telephone, and Telegraph's (PTT's) banded together to try again to prepare telecommunications equipment standards to facilitate inter-European trade in equipment and services. 5/ The results of these negotiations are not final. Even with this effort on the part of major telecommunications-equipment-producing countries, there is still a tendency for individual countries to adopt separate and often complicated and restrictive equipment standards.

There are two main reasons for countries to maintain individual standards. First, countries have maintained certain standards so as not to jeopardize the operation of the entire telecommunications system. Second, according to industry sources, there is a desire on the part of the telecommunications

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1/ If the Commission's recommendation is adopted for the TSUSA and Schedule B, appropriate changes will be made to the Harmonized Commodity Code.

2/ Increasingly, the FCC has required computer-type and radio-type equipment to be registered prior to use in the public network.

3/ General Agreement on Tariffs and Trade, Agreement on Technical Barriers to Trade, Geneva, 1979.

4/ Union of International Organizations, Yearbook of International Organizations, pp. A2623-A2629.

5/ "Electronics Weekly," Feb. 1, 1984, p. 11.

authority to discourage imports of this type of equipment by making the standards unique and purposefully complicated. 1/

As part of the MTN, all the countries 2/ listed above also signed the Agreement on Government Procurement. This agreement obligated the signatories not to discriminate against the products of other signatories in government purchases covered by the agreement. Each signatory was required to enumerate those governmental agencies whose purchases were covered. Significantly absent in the lists from all the countries was the purchases by the PTT's, 3/ which serves to illustrate the sensitivity of the telecommunications equipment industry in these countries.

The U.S. industry alleges that there are many nontariff barriers to trade in telecommunications equipment. In addition to lack of product standards and government procurement practices, industry representatives allege government subsidization of research and development (R. & D.) and production; export tax credits and insurance; value-added taxes on imports; import licensing; certification procedures by the telecommunications authority; domestic content provisions; and the general historical relationship between the purchaser (usually the PTT) and the supplier are an advantage to foreign producers. 4/

According to the complaints of the U.S. industry, Japan has had the most restrictive practices affecting the telecommunications equipment industry of the group of major supplier countries. Restrictions which have been in place in Japan include most of those listed above. 5/ In January 1981, the United States and Japan entered into a bilateral 2-year agreement designed to open up Government procurement of telecommunications equipment. Concurrently, Japan and the United States signed an agreement designed to facilitate Japanese purchases of U.S.-produced interconnect equipment (narrowly defined as CPE not including telephone instruments). 6/ In 1983, U.S. exports to Japan of all telecommunications equipment amounted to only $140 million, approximately 4.7 percent of the value of total procurements by the Japanese PTT, Nippon Telephone & Telegraph (NTT). 7/ The United States hesitated to renew the NTT procurement agreement in 1983, and Japan made a number of concessions designed to facilitate importation from the United States. In January 1984, the United

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1/ Ibid.

2/ The European Economic Community signed for its member states.

3/ The Agreement on Government Procurement, Agreement Reached in the Tokyo Round of the Multilateral Trade Negotiations, Message from the President of the United States: The Texts of the Trade Agreements Negotiated in the Tokyo Round of the Multilateral Trade Negotiations . . ., June 19, 1979.

4/ Alleged barriers to trade reported by respondents to the Commission's questionnaires are shown in app. F.

5/ Foreign Targeting and its Effects on U.S. Industries, Phase I: Report to the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives on Investigation No. 332-162 . . ., USITC Publication 1437, October 1983, pp. 49-72 and 150-154.

6/ Transcript of the hearing, Apr. 24, 1984, p. 105.

7/ The Wall Street Journal, Jan. 31, 1984. p. 34.

States decided to renew the modified agreement with hopes that U.S. manufacturers will be able to make inroads into the Japanese market. 1/

The U.S. industry alleges that the EC has made many arrangements for mutual cooperation in such areas as tax structures, import tariffs, and R. & D. One of particular importance in the area of telecommunications research is the European Strategic Program for Research and Development in Information Technologies (ESPRIT). 2/ ESPRIT, which was established in January 1983, is designed to provide the EC's information processing industry with the technological tools necessary to improve worldwide competitiveness. This is to be done by research grants to appropriate projects. In 1983, over $10 million was awarded to fund 38 projects. In France, a major reorganization of the telecommunications equipment industry began in 1976, partially to reduce French dependence on foreign suppliers. A U.S.-based firm was forced to sell its French subsidiaries, as was Sweden's major producer. 3/ In addition, the French Government nationalized two of the largest electronics manufacturers in France. There are now two cartels in France which supply to the PTT, one of which supplies transmission and switching equipment and the other supplies transmission and data communications equipment.

In order to supply switching and ancillary equipment to the Taiwanese market as well as to other Far Eastern markets, A.T. & T. is planning to build a production facility in Taiwan within the next year or two. The initial investment will be $40 million but is expected to reach $100 million in the near future. In addition, another large U.S.-based manufacturer plans to invest $8.5 million in a R. & D. facility in Taiwan. 4/

Pertinent Commission Investigations

In February 1979, the Commission, at the request of the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives, completed a study of the telephone terminal and switching equipment industry. 5/ The study, a baseline report, provided accurate shipments, exports, imports, and

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1/ According to a representative of the Communication Industries Association of Japan in testimony before the U.S. International Trade Commission on Apr. 24, 1984, the Japanese telecommunications industry will be reorganized similarly to the U.S. telecommunications industry by virtue of two bills before the Japanese Diet which are expected to be passed within 60 days. Transcript of the hearing, Apr. 24, 1984, p. 127.

2/ Foreign Industrial Targeting and Its Effects on U.S. Industries, Phase II: The European Community and Member States: Report to the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives on Investigation No. 332-162 . . ., USITC Publication 1517, April 1984, pp. 56-63.

3/ Foreign Industrial Targeting and its Effects on U.S. Industries: Phase II, The European Community and Member States; Report to the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives . . ., USITC Publication 1517, April 1984, p. 17.

4/ Department of State Airgram, May 19, 1984.

5/ A Baseline Study of the Telephone Terminal and Switching Equipment Industry: Report to the Subcommittee on Trade, Committee on Ways and Means of the U.S. House of Representatives on Investigation No. 332-92 . . ., USITC Publication 946, February 1979.

related data. The report also addressed barriers to trade and technological advances in the industry.

The Commission has made determinations with regard to dumping on three types of telecommunications equipment in recent years. In July 1982, the Commission determined that an industry in the United States is materially injured by reason of imports from Japan of certain amplifier assemblies and parts thereof. 1/ The amplifier assemblies were RF power amplifiers used in the uplink to communications satellites. The Department of Commerce, subsequently, will subject the imports of these amplifiers from Japan to special dumping duties.

In August 1983, the Commission determined that an industry in the United States is materially injured by reason of imports of high-capacity, tone-only pagers from Japan. 2/ The Department of Commerce subsequently subjected the imports of these pagers from Japan to special dumping duties.

In February 1984, the Commission determined that there is a reasonable indication that an industry in the United States is materially injured by reason of imports from Japan of cell-site transceivers and subassemblies thereof. 3/ The Department of Commerce announced on June 12, 1984, its preliminary determination that sales at less than fair value existed. The Commission thereupon instituted a final investigation to determine if injury has occurred. The Commission's final determination is expected on October 9, 1984.

On April 5, 1984, the Commission instituted investigation No. 337-TA-189 following a complaint by Corning Glass Works that imports of optical waveguide fibers produced and sent into the United States in cabled and uncabled form by Sumitomo Electric Industries, Ltd., were infringing Corning's United States patent. The complainant seeks an order against the importation and sale of such products; the optical waveguide fibers alleged to be infringing are made in Japan.

The Commission addressed telecommunications, telecommunications apparatus, and other product sectors in its study on foreign industrial targeting requested by the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives. 4/ The report is in three phases. Phase I was

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1/ Certain Amplifier Assemblies and Parts Thereof from Japan: Determination of the Commission in Investigation No. 731-TA-48 (Final) . . ., USITC Publication 1266, July 1982.

2/ Certain Radio Paging and Alerting Receiving Devices from Japan, Determination of the Commission in Investigation No. 731-TA-102 (Final) . . ., USITC Publication 1410, August 1983.

3/ Certain Cell-Site Radio Apparatus and Subassemblies thereof from Japan: Determination of the Commission in Investigation No. 731-TA-163 (Preliminary) . . ., USITC Publication 1488, February 1984.

4/ Foreign Industrial Targeting and its Effects on U.S. Industries Phase I: Japan, Report to the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives . . ., USITC Publication 1437, October 1983, and Foreign Industrial Targeting and its Effects on U.S. Industries: Phase II, The European Community and Member States: Report to the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives . . ., USITC Publication 1517, April 1984.

released in October 1983, and Phase II was released in April 1984. The released material contained information on the implications of foreign industrial targeting on the U.S. industries by Japan and by the European Community and its member States, respectively. The start of Phase III was announced by the Commission on May 24, 1984. Phase III pertains to Brazil, Canada, Korea, Mexico, and Taiwan. The Commission's findings will be submitted to the Subcommittee on Trade of the House Committee on Ways and Means on January 9, 1985.

Communications services and other service sectors were the subjects of a Commission study 1/ concerning the relations of U.S. exports of services to U.S. merchandise exports. The report was published in September 1982.

NEW COMPETITIVE ENVIRONMENT

The current competitive environment of the U.S. telecommunications industry has been shaped by numerous legislative, judicial, and regulatory actions which have significantly affected the industry producing telecommunications apparatus (app. G).

On the national level, the Willis-Graham Act of 1921 endorsed a policy of consolidation of telephone companies and the establishment of legally franchised monopolies within a given telephone and telegraph service area. In 1934, the Congress established the Federal Communications Commission to regulate all forms of telephone, telegraph, and wireless communications in the public interest. The establishment of common standards and universal interconnections between systems was encouraged.

After World War II, the Department of Justice brought an antitrust suit against A.T. & T. A consent decree resulted in 1956 which limited the Western Electric Co. to providing only those products used by the Bell System to provide telecommunications service. Prior to 1956, telephone companies had provided end-to-end services and, in the case of the Bell Systems, nothing was allowed to be connected or attached to the telephone system or its equipment unless it was manufactured or purchased by Western Electric. However, in 1956, the courts ruled that a Hush-A-Phone, which was used to muffle ambient noises, could be attached to the telephone handset since it was privately beneficial without being publicly detrimental. Although there was no immediate rush by manufacturers to supply equipment for attachment to or interconnections with the telephone systems, the court, in its decision, provided the earliest guidelines against which to judge petitions for the interconnection of foreign (not provided by the telephone company) equipment. Another small opening occurred in the market for telecommunications in 1959 with the FCC's decision which allowed the allocation of radio frequencies above 890 MHz to private companies for their use in setting up private telecommunications radio connections.

With the passage of the Satellite Communications Act of 1962, the Congress encouraged satellite communications technology and provided financing. This act specifically encouraged competitive procurement of the

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1/ The Relationship of Exports in Selected U.S. Service Industries to U.S. Merchandise Exports, Report of Investigation No. 332-132 . . ., USITC Publication 1290, September 1982.

materials necessary to build the system and thus created a market for both satellites and ground stations.

The issue of connection to or interconnection with the telephone network was raised again by the Carterfone case. In 1968, the FCC ruled that equipment which inherently would not harm the network must be allowed to be connected or attached regardless of source. Later decisions by the FCC would provide for direct connection of apparatus to the network. However, after Carterfone, a market for acoustically coupled devices such as automatic dialers, acoustic modems, facsimile machines, and the like was created.

After the Carterfone decision, telephone companies provided, for a fee, connecting protective devices for those customers who wanted to connect their own equipment to the public networks. However, the FCC began an investigation as to the feasibility of direct connection to the network. 1/ The result of this investigation was the current registration program. The registration program provides standards against which terminal or customer premises equipment is to be tested so as to insure that such apparatus when connected directly to the telephone network will not harm the network. Industry sources generally agree that this program marked the real beginning of the consumer-owned and consumer-installed mass market for telephones. The complete and final deregulation of customer premises equipment was provided for in the FCC's Computer II inquiry of 1980.

Direct competition in the provision of common carrier services was the result of the FCC's 1971 specialized common carrier decision. These carriers which now provide cut-rate long-distance service between major cities have become a large market for transmission equipment such as microwave radios and certain types of switching equipment.

The most recent event is the breakup of the Bell Telephone System occasioned by the antitrust suit filed by the Department of Justice in 1974. The consent agreement called for the separation of the 22 Bell System local operating companies into 7 regional holding companies completely independent of the original A.T. & T. parent, effective January 1, 1984. The operating companies are free to purchase their supplies and equipment at competitive prices in the open market, and, A.T. & T. is now free to enter any line of business. For instance, A.T. & T. is now selling computers made by Western Electric and has formed a joint venture with Europe's largest electrical equipment manufacturer to market products worldwide. 2/

INDUSTRY AND MARKET PROFILES

The World Market

The world market for all types of telecommunications equipment increased from $34.8 billion in 1978 to $54.5 billion in 1983, or by an average annual

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1/ FCC docket No. 19528.

2/ Communications and Data Networking, vol. 30, No. 1485, p. 59.

rate of 9.4 percent. 1/ World consumption of customer premises equipment rose the fastest during 1978-83, by an average annual rate of 11.3 percent, followed by transmission equipment, which increased from $7.3 billion to $12.2 billion, or by an average of 10.6 percent annually. During 1978-83, world consumption of switching equipment and cable, wire, and lightguide increased from $9.0 billion to $13.8 billion and from $7.0 billion to $9.0 billion, respectively, amounting to an average annual rate of increase of 8.9 percent and 5.0 percent, respectively. As a share of total world consumption of all types of telecommunication equipment, transmission equipment, switching equipment, CPE, and cable, wire, and lightguide accounted for 22, 26, 34, and 18 percent, respectively. This composition remained fairly stable throughout 1978-83. U.S.-based firms supplied 32 percent of the world market, and U.S. firms worldwide supplied 40 percent in 1982.

U.S. consumption of transmission equipment, on average, accounted for 35 percent of world consumption of transmission equipment during 1978-83. The U.S. share of world consumption of switching equipment generally declined from 27 percent in 1978 to 22 percent in 1983. For CPE and cable, wire and lightguide, the U.S. share averaged 41 percent and 23 percent, respectively, during 1978-83.

The U.S. Market

U.S. consumption and the effect of exchange rates

Apparent U.S. consumption of all types of telecommunications equipment as estimated by the Commission, 2/ based on official statistics of the U.S. Department of Commerce, 3/ increased irregularly from $10.0 billion in 1978 to $18.5 billion in 1983, or by an average annual compounded rate of 13.1 percent (table 4). The only year consumption fell was 1982, a recession year. Domestic shipments (total U.S. shipments less exports), on average, accounted for 94.2 percent of total consumption but decreased from 97.0 percent in 1978 to 89.2 percent in 1983. Total U.S. shipments grew irregularly from $10.5 billion in 1978 to $17.8 billion in 1983, or by 11.3 percent per year, while exports increased at an average annual rate of 12.4 percent. U.S. imports, as a share of consumption, increased steadily from 3.0 percent to 10.8 percent during 1978-83.

1/ See app. H for statistics on consumption of telecommunications products, by countries (tables H-1-H-5), U.S. exports, by countries (tables H-6-H-10), imports by countries (tables H-11-H-15), comparing U.S. consumption with foreign consumption of telecommunications products. It should be noted that data are estimated by the U.S. International Trade Commission.

2/ See app. I for the methodology used in the derivation of estimates.

3/ Data from questionnaire responses were not used because domestic purchasers did not provide data on leased equipment which appears to be a substantial segment of the market.

Table 4.--Telecommunications equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, 1967-83

Year	Producers' shipments 1/	Exports	Imports	Apparent consumption	Ratio of--	
					Imports to consumption	Exports to shipments
	Million dollars				Percent	
1967	3,504.9	77.7	29.0	3,456.2	0.8	2.2
1968	3,697.4	89.5	48.1	3,656.0	1.3	2.4
1969	4,450.9	123.8	41.0	4,368.1	.9	2.8
1970	5,149.2	146.7	61.6	5,064.1	1.2	2.8
1971	5,222.3	133.8	86.0	5,174.5	1.7	2.6
1972	5,638.1	135.1	96.1	5,599.1	1.7	2.4
1973	6,383.6	171.8	141.4	6,353.2	2.2	2.7
1974	6,890.5	285.4	186.0	6,791.1	2.7	4.1
1975	6,386.4	371.7	153.5	6,168.2	2.5	5.8
1976	7,179.5	439.6	128.5	6,868.4	1.9	6.1
1977	9,445.8	566.3	171.0	9,050.5	1.9	6.0
1978	10,457.3	748.5	300.1	10,008.9	3.0	7.2
1979	12,820.8	858.4	413.0	12,375.4	3.3	6.7
1980	14,762.0	969.9	559.1	14,351.2	3.9	6.6
1981	16,459.3	1,138.3	712.8	16,069.8	4.4	6.9
1982	16,156.7	1,319.2	1,018.1	15,855.6	6.4	8.2
1983	17,833.8	1,341.7	1,990.3	18,482.4	10.8	7.5

1/ Data includes exports.

Source: Estimated by the U.S. International Trade Commission from official statistics of the U.S. Department of Commerce.

The fastest growing segment of the telecommunications equipment industry was the market for transmission equipment. Apparent consumption of this equipment, on average, increased 22.9 percent per year during 1978-83, or from $1.8 billion to $5.2 billion (table 5). Total U.S. shipments increased from $1.8 billion in 1978 to $5.0 billion in 1983 or by an average of 22.0 percent per year. As a share of consumption, domestic shipments increased from 96.4 percent in 1978 to 97.4 percent in 1981 before decreasing to 93.6 percent in 1983. The inference that may be drawn is that imports, on average, accounted for 3.8 percent of consumption during 1978-83. Exports increased from $72.6 million in 1978 to $148.1 million in 1983 or, on average, by 15.3 percent per year. As a share of total shipments, exports averaged 3.4 percent during the six year period. Much of the increase in consumption and shipments of transmission equipment is attributable to point-to-point microwave links from ground station to ground station as well as from ground to air to ground via satellites.

Table 5.--Transmission equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, 1967-83

Year	Producers' shipments 1/	Exports	Imports	Apparent consumption	Ratio of--	
					Imports to consumption	Exports to shipments
	Million dollars				Percent	
1967	656.0	7.0	17.8	666.8	2.7	1.1
1968	720.0	8.1	29.4	741.3	4.0	1.1
1969	790.0	9.7	25.7	806.0	3.2	1.2
1970	826.0	12.2	37.3	851.1	4.4	1.5
1971	799.0	11.9	52.0	839.1	6.2	1.5
1972	877.0	14.1	58.1	921.0	6.3	1.6
1973	947.0	18.1	82.9	1,011.8	8.2	1.9
1974	1,028.0	30.4	106.6	1,104.2	9.7	3.0
1975	1,094.0	38.3	41.5	1,096.7	3.8	3.5
1976	1,283.0	54.1	42.3	1,271.2	3.3	4.2
1977	1,640.0	61.5	51.3	1,629.8	3.1	3.8
1978	1,839.0	72.6	66.1	1,832.5	3.6	3.9
1979	2,263.0	88.2	73.1	2,247.9	3.3	3.9
1980	3,028.0	98.8	92.1	3,021.3	3.0	3.3
1981	4,053.0	123.6	106.4	4,035.8	2.6	3.1
1982	4,490.0	139.6	185.3	4,535.7	4.1	3.1
1983	4,970.0	148.1	331.7	5,153.6	6.4	3.0

1/ Data includes exports.

Source: Estimated by the U.S. International Trade Commission from official statistics of the U.S. Department of Commerce.

Apparent consumption of switching equipment increased from $2.5 billion in 1978 to $3.1 billion in 1980 before declining to $2.7 billion in 1982 and then regaining strength in 1983, reaching $3.1 billion (table 6). Overall, the market for switching equipment increased at an average rate of 4.6 percent per year. U.S. shipments of such equipment followed the same trend as consumption, generally increasing from $2.6 billion in 1978 to $3.6 billion in 1983, for an overall average annual rate of increase of 6.3 percent. Domestic shipments accounted for over 99 percent of consumption in every year during 1978-83, creating the inference that import penetration was less than 1 percent each year. As a share of shipments, exports exhibited a generally increasing trend, from 7.6 percent in 1978 to 14.9 percent in 1983. In absolute terms, exports of switching equipment increased from $199.7 million in 1978 to $533.9 million in 1983 or by an average of 21.7 percent per year.

Table 6.--Switching equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, 1967-83

Year	Producers' shipments 1/	Exports	Imports	Apparent consumption	Ratio of--	
					Imports to consumption	Exports to shipments
	Million dollars				Percent	
1967	691.4	10.6	2/	680.6	2/	1.5
1968	774.3	12.0	2/	762.2	2/	1.5
1969	990.4	15.8	2/	974.6	2/	1.6
1970	1,199.5	22.7	2/	1,176.8	2/	1.9
1971	1,321.9	31.8	2/	1,290.2	2/	2.4
1972	1,299.5	20.1	2/	1,279.4	2/	1.5
1973	1,445.1	25.7	2/	1,419.3	2/	1.5
1974	1,674.3	37.4	2/	1,636.8	2/	2.2
1975	1,645.1	59.8	2/	1,585.3	2/	3.6
1976	1,815.6	89.4	5.0	1,731.2	0.3	4.9
1977	2,456.7	101.4	6.0	2,361.2	.3	4.1
1978	2,644.1	199.7	12.0	2,456.5	.5	7.6
1979	3,065.2	232.4	22.4	2,855.1	.8	7.6
1980	3,414.6	307.9	28.2	3,134.8	.9	9.0
1981	3,335.0	385.5	15.1	2,964.5	.5	11.6
1982	3,210.6	523.9	16.8	2,703.4	.6	16.3
1983	3,592.7	533.9	27.6	3,086.3	.9	14.9

1/ Data includes exports.
2/ Estimated to be nil or negligible.

Source: Estimated by the U.S. International Trade Commission from official statistics of the U.S. Department of Commerce.

The relatively slow growth rate for consumption of switching equipment during 1978-83 is believed to have been caused by the 1982 recession year, an anticipated change to digital technology, the increased use of private branch exchanges and other customer premises equipment (CPE) such as key systems which route calls on the customers' premises, and uncertainties about the effects of the impending divestiture.

Apparent consumption of CPE increased irregularly from $4.3 billion in 1978 to $8.5 billion in 1983, or by an average annual rate of 14.7 percent (table 7). Domestic shipments of CPE accounted for a progressively decreasing share of consumption, from 95.0 percent in 1978 to 81.3 percent in 1983, inferring that import penetration increased from 5.0 percent to 18.7 percent during the period. Total U.S. shipments followed the same trend as consumption, increasing irregularly from $4.3 billion in 1978 to $7.4 billion in 1983, with exports, on average, accounting for 7.2 percent of annual shipments during the period. Exports of CPE increased steadily from $314.6 million in 1978 to $520.8 million in 1982, before decreasing to $495.0 million in 1983.

Table 7.--Customer premises equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, 1967-83

Year	Producers' shipments 1/	Exports	Imports	Apparent consumption	Ratio of--	
					Imports to consumption	Exports to shipments
	Million dollars				Percent	
1967	1,295.0	38.8	11.2	1,267.4	0.9	3.0
1968	1,389.0	38.8	18.6	1,369.3	1.4	2.8
1969	1,711.0	73.7	15.2	1,652.5	.9	4.3
1970	1,967.0	69.7	24.2	1,921.5	1.3	3.5
1971	1,975.0	59.6	33.8	1,949.2	1.7	3.0
1972	2,211.0	66.9	37.8	2,181.9	1.7	3.0
1973	2,494.0	78.3	56.8	2,472.5	2.3	3.1
1974	2,682.0	12.6	76.6	2,633.0	2.9	4.7
1975	2,556.0	176.8	109.7	2,488.9	4.4	6.9
1976	2,763.0	231.6	74.8	2,606.2	2.9	8.4
1977	3,718.0	266.5	106.9	3,558.4	3.0	7.2
1978	4,328.0	314.6	213.7	4,277.1	5.0	7.3
1979	5,412.0	381.8	301.4	5,331.6	5.7	7.1
1980	6,267.0	454.7	408.6	6,220.9	6.6	7.3
1981	7,042.0	492.1	552.8	7,102.7	7.8	7.0
1982	6,690.0	520.8	775.0	6,944.2	11.2	7.8
1983	7,392.0	495.0	1,582.4	8,479.4	18.7	6.7

1/ Data includes exports.

Source: Estimated by the U.S. International Trade Commission from official statistics of the U.S. Department of Commerce.

The growth rate in apparent U.S. consumption of CPE in recent years has accelerated as businesses and residential customers purchased private branch exchanges, key systems, data display terminals, telephones, and other CPE in an effort to reduce the cost of communicating. Imported articles during this period have made up an increasing share of the CPE consumed.

The slowest growing segment of the telecommunications equipment industry during 1978-83 was the market for cable, wire, and lightguide. Apparent consumption of this equipment increased from $1.5 billion in 1978 to $2.0 billion in 1981 before decreasing to $1.7 billion in 1982 (table 8). The year 1983 witnessed a slight recovery of this industry when consumption increased to $1.8 billion. During 1978-83, however, apparent consumption of these articles increased at an average annual rate of only 3.4 percent. As a share of consumption, domestic shipments decreased from 99.5 percent in 1978 to 97.3 percent in 1983; conversely, imports increased their share of the market from 0.5 percent to 2.7 percent during this period. Total U.S. shipments followed a trend similar to that of consumption, increasing from $1.6 billion in 1978 to $2.1 billion in 1981 before declining to $1.8 billion in 1982 and then increasing again in 1983 to $1.9 billion. The overall average annual growth rate was 2.7 percent during 1978-83. As a share of total shipments, exports

of cable, wire and lightguide fluctuated but averaged 7.6 percent annually during the six-year period. In value, exports decreased from $161.1 million in 1978 to $108.6 million in 1980 before increasing irregularly to $164.7 million in 1983, for a total increase of 1.4 percent over the period. The increased use of microwave links and the increasing use of lightguide 1/ in lieu of wire or cable has softened somewhat the market for cable, wire, and lightguide.

Table 8.--Cable, wire, and lightguide: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, 1967-83

Year	Producers' shipments 1/	Exports	Imports	Apparent consumption	Ratio of--	
					Imports to consumption	Exports to shipments
	Million dollars				Percent	
1967	862.5	21.3	2/	841.5	2/	2.5
1968	814.5	31.1	0.1	784.0	2/	3.8
1969	959.5	24.7	.1	934.8	2/	2.6
1970	1,156.7	42.0	.1	1,114.7	2/	3.6
1971	1,126.4	30.5	.2	1,096.0	2/	2.7
1972	1,250.6	34.1	.2	1,216.8	2/	2.7
1973	1,497.5	49.7	1.7	1,449.5	0.1	3.3
1974	1,506.2	91.9	2.8	1,417.1	.2	6.1
1975	1,091.3	96.2	2.4	997.4	.2	8.8
1976	1,317.9	64.5	6.4	1,259.5	.5	4.9
1977	1,631.1	136.9	6.9	1,501.1	.4	8.4
1978	1,646.2	161.1	8.2	1,492.8	.5	9.8
1979	2,080.6	156.0	16.0	1,940.6	.8	7.5
1980	2,052.4	108.6	30.3	1,974.0	1.5	5.3
1981	2,065.3	137.0	38.5	1,966.8	1.9	6.6
1982	1,766.1	134.8	41.0	1,672.3	2.4	7.6
1983	1,879.1	164.7	48.6	1,763.0	2.7	8.8

1/ Data includes exports.
2/ Less than 0.1 and considered negligible.

Source: Estimated by the U.S. International Trade Commission from official statistics of the U.S. Department of Commerce.

At this time, the effect of international monetary exchange rates appears to have been negligible on overall consumption owing to the monopolistic structure or the government-owned nature of the telecommunications industries throughout the world through 1983. International trade has been small in relation to consumption in major markets in nearly all of the telecommunications

1/ While the market for lightguide is growing, lightguide is more efficient and less of it is required to perform the same function as cable and wire.

market subsectors with the exception of CPE. In the case of CPE, the change in the U.S. regulatory climate provided an opportunity for international monetary exchange rates to make a difference. However, it is unlikely that imports of CPE such as cordless telephones and telephone sets will be affected significantly by the dollar exchange rate. These devices, like other consumer electronic products such a radio, TV, and Citizens Band radio transceivers, are priced very low by foreign exporters in East Asia. In virtually all cases, monumental exchange rate adjustments would be needed to equate the foreign prices to the U.S. prices if the transactions were conducted in the medium of the foreign currency. However, indications are that most transactions are dollar denominated rendering the effect of exchange rate fluctuation minimal.

Of the 122 companies that responded to the question of whether exchange rates were important in their purchasing decisions, 77 responded that exchange rates had no effect, 29 indicated that exchange rates had a minimal effect but could possibly have an effect if the exchange rate were to change radically. Sixteen responded that exchange rates were a primary factor in the past and would be in future purchasing decisions.

Many respondents who answered that exchange rates had or would have no effect explained that compatibility of products, availability, service, and other performance factors played a much larger role in their purchasing decisions than did cost (which includes effects of exchange rates). In addition, others alleged that the underlying reasons for major exchange rate fluctuations (a larger deficit which tends to increase the interest rates, which in turn leads to an increase in the value of the dollar vis a vis foreign currency) may make imports more attractive (relatively cheaper) but may also inhibit domestic investment. Also, many companies noted limited trade, significantly cheaper imports of consumer items, and dollar denominated transactions as other reasons why the exchange rate plays a small or no role in purchasing decisions. The effect of exchange rates is treated further in appendix J.

Position of U.S. firms

While the Bell System was intact, the major U.S. manufacturer of telecommunications equipment, Western Electric (WE), had a multi-billion dollar captive market. Western Electric supplied this market with equipment reputed to be designed for high reliability and long-term service. Other major manufacturers competed for sales to independent telephone operating companies. Accordingly, Western Electric and, to a lesser degree, the other major captive supplier faced no substantitive competition from other domestic firms. A.T. & T. was the manufacturer and the market for most of the telecommunications equipment used in the United States. Of the four equipment categories, CPE was the principal one where a substantial market outside the Bell System was created. As a result of FCC decisions which allowed non-Bell equipment to be connected to the publicly switched network, such items as PBX's, telephone answering devices, modems, and telephone instruments have been manufactured and marketed more aggressively in recent years in competition with Bell-supplied equipment. U.S. firms (other than Western Electric) have been able to penetrate the markets for the more sophisticated equipment better than the markets for the consumer-type equipment. For

example, U.S. firms (other than Western Electric) do well in sales of PBX's to businesses.

Position of foreign firms

Because A.T. & T. both manufactured the equipment used in the domestic telecommunications system and operated the largest portions of it, neither other domestic firms nor foreign firms were able to penetrate the U.S. market to any great extent until the FCC's decisions on CPE, as previously mentioned. Foreign firms have not as yet penetrated the total telecommunications market to any great extent; however, they have made significant inroads in markets for certain kinds of equipment. For example, while import penetration for all telecommunications equipment was 10.8 percent in 1983, import penetration in CPE was 18.7 percent. The recent boom in cordless telephones is one example of how foreign firms have entered the U.S. market and effectively discouraged U.S. firms from manufacturing. It is in this consumer-oriented market that foreign firms currently compete the best.

The largest source of U.S. imports of CPE during 1979-83 1/ was Japan. Imports of CPE from Japan increased from $129 million to $582 million during this period for an average annual growth rate of 45.7 percent. While Japan was the largest source of such imports, imports from Hong Kong, Taiwan, and the Republic of Korea (Korea) grew at even faster average annual rates during 1979-83--157 percent, 139 percent and 99 percent, respectively. In 1983, imports from these countries amounted to $234 million, $320 million, and $162 million, respectively. The ratio of combined imports from Japan, Taiwan, Hong Kong, and Korea to total apparent U.S. consumption of CPE in 1983 was 15.3 percent, and accounted for 82 percent of total U.S. imports.

Import penetration for the other equipment categories had not risen above 10 percent by 1983. Import penetration of the U.S. market for transmission equipment increased from 3.3 percent in 1979 to 6.4 percent in 1983--Japan was, by far, the largest source of such imports, accounting for 34 percent of all such imports in 1983. Concerning the import-to-consumption ratio of switching equipment, that ratio fluctuated during 1979-83, but never rose above 1.0 percent. Again, Japan was the largest source accounting for 53 percent of all such imports in 1983. With respect to the U.S. market for cable, wire, and lightguide, the import penetration ratio increased from 0.8 percent in 1979 to 2.7 percent in 1983, with Mexico being the primary source. Imports from Mexico accounted for 44 percent of all such imports in 1983--due primarily to U.S. producers taking advantage of the lower production cost of labor-intensive subassembly work in Mexico by using TSUS items 806.30 and 807.00 to export cable and wire to Mexico prior to importing them at a more advanced stage of assembly and paying duty only on the added value. As the kind of equipment marketed becomes more complex or requires customization on the customer's premises, foreign firms have not done as well as U.S. firms. However, a number of foreign firms have established U.S. operations specializing in final assembly or customizing imported equipment to meet the customer's requirements, and a few firms have even established U.S. manufacturing operations. The establishment of a final assembly or

1/ Reliable detailed country data were only available for the period 1979-83.

manufacturing presence in the United States may be expected to benefit the foreign firm undertaking such an operation.

Competitive assessment factors

In assessing the competitive advantage of U.S.-made products vis-a-vis foreign-made products in the U.S. marketplace, domestic producers were asked in the Commission's questionnaires whether domestic or foreign products, by countries, had an advantage in the various features for each of the nine major telecommunications product areas. In addition, these companies were asked whether they expected these comparative advantages to continue. The resulting frequency distributions are presented in appendix K. Only two countries, Japan and Canada, had products capable of causing disagreement among the respondents concerning the overall competitive advantage of the U.S.-made products over the foreign-made products (see following sections). For all other countries, it was almost unanimously reported that U.S. products had the overall competitive advantage and had the advantage in each of the rating factors; furthermore, the respondents reported that these conditions would not change in the short or long term.

Japanese products.--For transmission equipment, all firms that responded with a competitive comparison reported that the U.S.-made products had the overall competitive advantage. In fact, these responding producers overwhelmingly considered that the U.S.-made product had the competitive advantage in all factors considered. The same trend was reported for switching equipment, including central office switches. Concerning the overall competitive advantage for all CPE, the responses were split--five for domestic and five for the Japanese-made product. When considering the individual rating factors for PBX's, the responses indicate that the U.S. product has more competitive advantages than the Japanese products. With key systems, however, the respondents indicated that the Japanese product had the overall advantage and likewise for many of the individual rating factors. For data display terminals, the results overwhelmingly indicate that U.S. producers feel that the U.S. product has more competitive advantages vis-a-vis the Japanese articles. For cable, wire, and lightguide, the responses, although scarce, indicate that, again, the U.S. product is more competitive than the Japanese products.

When asked if they expected these competitive advantages to change in the short term (1984-88) and the long term (1989-93), most producers felt they would not change in either the long or short term. Some of the reasons given by those that felt that the situation would change in both the short and long term included increased availability of foreign products due to the deregulatory atmosphere in the United States and anticipated lower prices for Japanese products; on the other hand, a growing realization is expected on the part of the consumer that imported products, while cheaper, are inferior products.

Canadian products.--Concerning transmission equipment, all reporting companies believed that the domestic product had the overall competitive edge; this was also the case for the individual rating factors. This trend holds fairly well for all the product groupings with the exceptions of central office switches and PBX's. In these two product areas, the responses were

evenly divided between the U.S.-made and Canadian-made equipment for the overall competitive advantage. For individual rating factors for these two product categories, the responses were mixed. It was almost unanimously reported that these factors were not expected to change in the short or long term.

When asked what their company had done in response to foreign competition, only a few respondents reported that they had shifted to more advanced product lines, implemented cost-reduction efforts, or attempted to improve the quality of their product. A few reported that they opened manufacturing facilities abroad, closed production lines, or began importing products.

Price-related factors affecting U.S. purchases

Transmission equipment.--The Bell operating companies (BOC's) and independent telephone companies * * * from 1981 to 1983. They most frequently cited their * * * the share of imports in purchases by long distance carriers 1/ has * * * in 1983, for example, * * *. The increase in imports has accompanied * * * the proportion of equipment purchased from affiliated domestic suppliers has * * * as shown in the following tabulation showing market shares of suppliers of transmission equipment compiled from answers to a Commission questionnaire (in percent):

Type of supplier	1981	1982	1983
Affiliated domestic	***	***	***
Nonaffiliated domestic	***	***	***
Foreign	***	***	***

Of those purchasers who chose foreign equipment, availability of equipment, superior design, and lower price were cited equally often; however, of those purchasers who chose domestic equipment, availability was the second most commonly cited reason for selection. Lower price was also cited as an advantage of the domestic manufacturer (table 9). This indicates that domestic producers have a price advantage in some sectors of the overall market for transmission equipment and a price disadvantage in others.

1/ Includes A.T. & T. Long Lines Department, as well as the specialized common carriers and other common carriers providing long-distance services.

Table 9.--Telecommunications equipment: Aggregated response of U.S. purchasers as to the reasons they purchased foreign and domestic products, by products, 1981-83

Item	Transmission equipment	Switching equipment	Class 5 central office equipment	Customer premises equipment	Telephone sets	Private branch exchanges	Key system switching equipment	Data terminals	All telecommunications equipment
	Reasons for purchasing foreign products								
Lower purchase price (delivered)	7	5	0	3	4	2	4	2	0
Servicing/training	2	2	0	1	0	0	0	0	0
Favorable financing terms	1	1	0	0	0	0	0	0	0
Favorable warranties	2	1	0	1	1	0	0	0	0
Performance features:									
Superior design	7	5	0	4	3	3	3	2	0
More efficient operation	3	1	0	1	0	0	1	1	0
More durable	1	1	0	3	2	0	2	1	0
Less maintenance	3	0	0	2	1	0	2	0	0
Energy efficiency	2	0	0	0	0	0	0	0	0
Other	1	0	0	1	0	0	0	1	0
Shorter delivery time	3	3	1	1	2	0	1	2	0
Availability	7	4	1	2	5	3	3	2	0
Supplier relationship	3	2	0	2	0	1	0	2	0
Ability to add to or upgrade equipment capability	5	2	0	0	0	0	0	0	0
Availability of spare parts	4	1	0	1	1	0	1	2	0
Compatibility with existing systems	5	4	1	1	1	0	0	2	0
Lower installation costs	1	2	0	4	2	2	3	0	0
	Reasons for purchasing domestic products								
Lower purchase price (delivered)	29	25	15	27	18	16	17	13	2
Servicing/training	29	29	18	22	17	24	18	18	1
Favorable financing terms	1	0	1	3	4	3	2	1	0
Favorable warranties	13	9	8	16	19	15	12	11	1
Performance features:									
Superior design	19	18	15	17	16	16	14	11	1
More efficient operation	11	13	11	10	7	10	12	7	0
More durable	5	5	3	11	15	8	8	9	1
Less maintenance	8	9	9	12	13	10	12	11	1
Energy efficiency	5	5	4	5	5	5	5	5	0
Other	2	1	1	4	4	4	2	4	0
Shorter delivery time	19	11	5	25	23	21	18	19	2
Availability	35	29	21	32	32	27	24	26	2
Supplier relationship	27	25	20	30	31	25	25	20	2
Ability to add to or upgrade equipment capability	29	28	18	25	13	24	19	16	1
Availability of spare parts	28	26	19	25	23	24	22	20	1
Compatibility with existing systems	36	27	19	31	25	26	21	21	1
Lower installation costs	4	3	2	7	5	6	8	3	0

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Followup questioning * * * purchasers of transmission equipment confirms that availability has been the major factor in decisions to buy from foreign suppliers. One respondent reported that there are no significant differences in price and performance between imported and domestic equipment in the broad subcategories of multiplexers and microwave transceivers. This purchaser has recently bought a large share of equipment from foreign suppliers owing to its strategy of diversifying its sources of supply. However, lower price has influenced decisions to buy foreign auxiliary equipment. For example, one purchaser reported buying a large number of microwave radio test sets from a Japanese manufacturer because they were cheaper than domestically made sets.

Central office switching equipment.--The combined share of purchases of central office (CO) switching equipment from foreign and nonaffiliated domestic suppliers rose from almost * * * percent in 1981 to over * * * percent in 1983, as shown in the following tabulation compiled from responses to the Commission's questionnaire:

Type of supplier	1981	1982	1983
Affiliated domestic	***	***	***
Nonaffiliated domestic	***	***	***
Foreign	***	***	***

The BOC's were the largest purchasers, * * * in 1981-83 of all the CO switching equipment purchased by respondents to the Commission's questionnaire. The BOC's bought * * * switching equipment from foreign suppliers during this period, * * *. The remaining purchasers, mainly long-distance carriers and independent telephone companies, * * * and they * * * of CO switching equipment they purchased from foreign suppliers.

Of the 19 respondents to the Commission's purchaser questionnaires that bought CO switching equipment from 1981 to 1983, 6 reported that they bought equipment from foreign suppliers. Lower price and superior design were most often cited as reasons for the foreign purchases. Service and availability were cited most often as important reasons for selecting domestic suppliers, but lower price was also cited often as a determining factor. As is the case with transmission equipment, domestic and foreign producers of switching equipment have advantages in different subsectors of this market.

Followup questioning of the largest purchasers of foreign CO switching equipment confirmed that the availability of supply and unique performance features were major factors in decisions to buy from foreign suppliers. There are * * * foreign-owned suppliers of CO switching equipment to the U.S. market, * * *. One

* * *.

purchaser reported that availability of supply and, to a lesser extent, favorable financing were the deciding factors in its purchases of foreign CO switching equipment. A second large purchaser of switching equipment chose foreign equipment because it worked better for international traffic. In addition, the purchaser intended to use the imported switching equipment in conjunction with existing switches from the same foreign supplier. Once again, availability rather than price was the most important factor in the purchaser's decision to buy foreign CO switching equipment.

Customer premises equipment.--The Commission gathered data on four specific types of CPE. The data on telephone sets, PBX's, key systems, and data display terminals are discussed in the following sections.

Telephone sets.--Since 1979, the unit value of domestic shipments (f.o.b.) of telephone sets has been, on average, 51 percent greater than the unit value of imports (c.i.f. duty paid). This difference in unit value has tended to increase over time, from 32 percent in 1979 to 95 percent in 1982. The trend is clearest in relation to the East Asian countries except Japan. The average unit value of imports from these countries dropped from $41 in 1979 to $19 in 1982. In contrast, the average unit value of U.S. shipments rose from $29 to $53 in the same period. Prices of imports from Japan rose in 1981, when the average unit value of its telephone exports more than doubled to $78, a level 61 percent greater than that of domestic shipments. 1/ The price of these imports has since fallen to a level comparable with the domestic unit value, as shown in the following tabulation: 2/

Source of supply	1979	1980	1981	1982
Imported	$21.81	$24.82	$54.49	$27.24
Domestic	28.80	40.03	48.25	53.02

Data from the Commission's questionnaires, however, show that the median average unit selling prices of imported telephone sets have declined steadily from 1981 to 1983, whereas the median average unit selling prices of domestic shipments have increased steadily over the same period, as shown in the following tabulation:

Item	1981	1982	1983
Reported by U.S. importers	***	***	***
Reported by U.S. producers	***	***	***

1/ Imports of telephone sets from Japan in 1982 amounted to 844,000 units, or 15.5 percent of the total number of units imported.

2/ United States Department of Commerce Statistics, Series IM-146 and Current Industrial Reports: Selected Electronic and Associated Products, 1981 & 1982.

The trends in these average unit prices clearly reflect not only changes in prices, but also the dramatic change in the composition of U.S. imports of telephones that has occurred in the last few years. From 1981 to 1983, although U.S. shipments of telephones stagnated, the number of imported telephone instruments increased almost 10 times, from 2.6 million to 25.8 million. Approximately 95 percent of this increase was in imports from Taiwan, Hong Kong, and Korea, for which the unit value has fallen most drastically. Data from the Commission's questionnaires tend to understate the actual decline in unit values, because they do not include many importers and retail distributers of the very inexpensive imports. Such large domestic retailers are those that do not specialize in telephone sales.

As can be seen in the two preceding tabulations, neither official statistics from the Department of Commerce nor data from the Commission's questionnaires permit accurate price comparisons for the various types of telephones. In responses to the Commission's questionnaires to purchasers, availability and price were not often cited as advantages of imports, whereas availability and compatibility with existing equipment were most often cited as advantages of domestic suppliers, although price was also cited often as an advantage of domestic suppliers. This indicates that domestic producers and importers may have price advantages in different sectors of the overall market for single line telephones.

In questioning industry representatives, one industry source reported that the U.S. market is nearly saturated with cheap, low-quality telephones from such East Asian countries as Taiwan, Hong Kong, and Korea. A U.S. supplier initially dominated the submarket for one-piece telephones, but these East Asian suppliers soon captured the dominant share in this market by offering substantially lower prices. According to another industry source, since 1977, domestic manufacturers have retained an estimated 60- to 70-percent share of the market for standard desk telephones. Because of mature technology, domestically produced desk sets generally are of higher quality than imports with regard to tone, dialing action, and durability. Some domestic producers continue to engineer and manufacture highly durable desk telephones at comparatively high prices, expecting that consumers are willing to pay more for better quality and a well-known brand. 1/ However, some domestic producers are entering the lower quality, lower priced end of the market. 2/

According to industry representatives, availability was the initial factor underlying the Japanese dominance of the submarket for electronic telephones. Although the microprocessor technology upon which these telephones are based was first developed in the United States, domestic manufacturers, which were dependent on sales of electromechanical telephones, fell behind in developing and marketing electronic models of their own. According to one industry source, the domestically made electronic telephones which are now entering the market generally embody more advanced technology, but even after differences in performance are taken into account, they appear to be at a price disadvantage.

1/ Wall Street Journal, Feb. 28, 1984, p. 11.
2/ Communications Week, Jan. 30, 1984, p. 16.

The sale of decorator telephones at an average unit price of $100 exceeded sales in all other categories of telephones at the retail level in 1982. 1/ Competition among domestic and foreign suppliers of character, or decorator telephones depends not only on product differentiation, but also on price. East Asian suppliers currently dominate U.S. sales in this submarket. According to industry representatives, they appear to enjoy a competitive cost advantage which is enhanced by a favorable exchange rate.

Cordless telephones are the fastest growing segment of the submarket for telephones. From 1982 to 1983, the quantity of imports rose more than four times, from 1.9 million to 8.4 million units. Although the average unit value of imported cordless telephones declined from $56 to $44, the total value of imports more than tripled, rising from $107.4 million in 1982 to $368.8 million in 1983. 2/ Since domestic suppliers have discontinued their U.S. production of cordless phones, imports have dominated this submarket. 3/

Private branch exchanges.--Unlike single-line telephones and key systems, private branch exchanges (PBX's) form a category of customer premises equipment in which the vast majority of equipment from foreign-owned suppliers is assembled to customer specification and finished in this country. * * * Japanese manufacturers of PBX's, for example, maintain production facilities in the United States. The first of these companies recently reported * * * of its total manufacturing takes place in the United States.

Like the Japanese manufacturers of PBX's, suppliers owned by Canadian and, to a lesser extent, by European companies have also established U.S. production facilities. Consequently, only a very small percentage of the PBX's sold in this country qualify as 100 percent imported. This severely limits the usefulness of the price comparison between the domestic and imported equipment, since the domestic product may contain a significant amount of foreign value added. Further, the Commission did not request price data on domestic and imported subassemblies. Only two respondents to the Commission's questionnaires reported purchases of imports of private branch exchanges. As seen in the following tabulation, the difference in average price of these imports and that of domestic units is due mostly to differences in average size of the individual units and differences in features offered:

Item	1981	1982	1983
Reported by U.S. importers	***	***	***
Reported by U.S. producers	***	***	***

1/ 1983-1984 Telecommunications Source Book, NATA, p. 125.

2/ Compiled from official statistics of the U.S. Department of Commerce, Series IM-146 (TSUSA item 685.2966).

3/ T.V. Digest, Feb. 27, 1984, p. 15.

Purchasers who bought imported PBX's most often cited superior design and availability as reasons they selected a foreign supplier, whereas purchasers who selected domestic equipment most often cited availability, compatability with existing systems, and supplier relationships as reasons for their purchases.

Competition among domestic suppliers has markedly reduced per line prices for most line sizes of PBX equipment. Particularly in regard to bids for contracts with the regional holding companies, competitors have accused each other of offering prices so low as to suffer a loss on initial sales of PBX's in order to win later sales of add-on equipment and other services. 1/ Price competition often takes the form of rebates and attractive financing to end users. The latter has reportedly been the deciding factor in many recent PBX sales, although PBX prices are expected to bottom out after the 1983 price wars as smaller suppliers and vendors are forced out of the market. 2/

The competitive pricing strategy of Japanese manufacturers seems to be less successful in the U.S. submarket for PBX's than it has been in the submarket for electronic key systems. According to an industry source, Japanese-owned suppliers lost market share in the United States from 1979 to 1982.

Given the intense price competition in the U.S. market, manufacturers have been under pressure to incorporate the latest technological advances into their products. According to industry sources, U.S. firms appear to lead in the performance and technological sophistication of their equipment, and the importance of changing technology in the highly competitive U.S. market for PBX's has been a major factor causing foreign-owned suppliers to move their operations to the U.S. market. These suppliers turn to U.S. domestic operations in order to adapt their hardware in final assembly to meet the particular requirements of U.S. purchasers. For example, a major Japanese-owned manufacturer in this country has reportedly "tailor-made" its PBX's for the BOC market. 3/ Moreover, foreign-owned suppliers are also under mounting pressure to develop their products in the United States as PBX's become increasingly software driven. These trends explain the near absence of imports of finished PBX's into this country.

Key systems switching equipment.--This is the second major category of telecommunications equipment in which nearly all equipment from foreign-owned suppliers is imported and sold to distributors in finished condition, although foreign suppliers have been moving stages of their operations, such as software design and final assembly, to the United States. This facilitates comparison between prices of domestic and imported key systems.

As seen in the following tabulation, a comparison of the medians of domestic and foreign average unit-selling prices shows that among respondents to the Commission's questionnaires, the median average price of imported key system switching equipment was substantially higher than that for the domestically produced equipment:

1/ Electronic News, Jan. 1, 1984, p. 85.
2/ Ibid., p. 45.
3/ Business week, Dec. 5, 1983, p. 180.

Item	1981	1982	1983
Reported by U.S. importers	***	***	***
Reported by U.S. producers	***	***	***

This difference in average prices may reflect a difference between foreign and domestic types of equipment supplied to the U.S. market. Price was most often cited as a reason for purchases of foreign equipment; availability and supplier relationships were most often cited as reasons for purchases of domestic equipment.

As in the case of electronic telephones, Japanese manufacturers took an early lead in U.S. sales of electronic key telephone systems (EKTS) simply because of availability; they were the first to incorporate microprocessor technology into their equipment. The bulk of domestically made key equipment even in recent years has been electromechanical. One industry source explains that key system users have had little incentive in the past to switch from the familiar equipment, although this is expected to change in the future.

Price comparison of domestic and imported key equipment is best made at the wholesale level, where domestic and imported equipment first meets in the marketplace before distribution and installation. A large distributor of key equipment reports that the differences between the equipment he purchases from a Japanese supplier and from a large U.S. supplier are price and quality. Both suppliers have comparable delivery times, availability, and credit terms, but the Japanese supplier offers equipment that is of better quality (requiring less maintenance) at a lower price per line size.

Other industry sources confirm this assessment, adding that Japanese suppliers have adopted a strategy of competitive pricing in order to achieve high penetration of the U.S. market for key systems. Industry sources expect intensifying competition to push down prices, reduce profit margins, and force out small manufacturers. Competition is reported keenest in sales of electronic key equipment with fewer than five lines, where substantial price discounts are available to distributors for volume purchasing.

Data display terminals.--Domestic suppliers appear to account for the bulk of U.S. sales in this market. Responses to the Commission's questionnaires reveal that purchases of foreign-made equipment from 1981 to 1983 * * *. Respondents to purchaser questionnaires, * * * report that * * * percent of their total expenditure on data display equipment during the last 3 years was on foreign-made equipment. * * * percent of their purchases was from nonaffiliated foreign suppliers. It must be noted, however, that a number of large U.S. manufacturers import data terminals under their own private labels. Therefore, U.S. purchasers may be unaware that they are buying imported products.

In all, only five respondents reported purchases from nonaffiliated foreign suppliers. * * * were from Japanese suppliers because of

customer requirements and compatibility with existing equipment. * * * purchasers were from Canadian suppliers, in one instance because of reportedly superior design and in the other because of availability and lower price. Finally, * * * reported buying printers from Taiwan because of their low price. As with the other categories of telecommunications equipment, differences in composition between imports and domestic data display terminals make it impossible to use average unit prices to conclude whether foreign or domestic suppliers have a price advantage for comparable products. However, as seen in the following tabulation, comparison of foreign and domestic median average unit values reported by U.S. importers and U.S. producers in response to the Commission's questionnaires indicates that prices of imported data display terminals have been declining, whereas average unit values of domestic output have been rising:

Item	1981	1982	1983
Reported by U.S. importers	***	***	***
Reported by U.S. producers	***	***	***

Among the respondents, price was cited as often as any other reason for the few purchases of foreign data display terminals, whereas availability was most often cited as the reason for choosing a domestic supplier.

Cable, wire, and lightguide.--Domestic suppliers account for a large share of U.S. sales of cable, wire, and lightguide. Responses to purchasers' questionnaires show that * * * percent of cable, wire, and lightguide sold in this country during the last 3 years was imported. Data from the Commission's questionnaires do not permit comparisons of unit prices in this category, largely due to the difficulties involved in defining units of value. However, the responses indicate that price and availability were most often cited as reasons for foreign purchases, whereas availability and supplier relationships were most often cited as advantages for domestic producers, although price was also cited frequently as a reason for purchases from domestic producers.

Domestic suppliers have the dominant share of the cable and wire markets, because there are few foreign suppliers that manufacture cable and wire to U.S. specifications. In the mature manufacturing processes for these products, domestic suppliers have long enjoyed the economies of scale that usually come with large sales. Lightguide, however, is a new technology that will partially replace cable and wire in future telecommunications systems. Although industry sources estimate that Japanese suppliers had only a 5-percent share of sales in the combined market for fiber-optic cable in 1982, they expect this share to climb sharply in the next 5 years because of the aggressive pricing strategy of Japanese suppliers. These sources claim that Japanese suppliers have undercut the prices of domestic suppliers despite a 13.1-percent tariff on imported lightguide, in an effort to capture a significant share of the U.S. market.

Bypass prospects

The Commission solicited responses from a stratified random sample of 100 of the 500 largest U.S.-based manufacturing and 500 largest service firms, as of 1982, in order to measure the potential for purchasing equipment and for bypassing the publicly switched network. Sample responses were extrapolated to estimate anticipated purchases for the 1,000 firms. In addition to anticipated purchases, the Commission requested historical data on actual purchases. These data are summarized in the following tabulation (in millions of dollars):

Equipment type	1981	1982	1983
Transmission equipment--	79	85	78
Switching equipment-----	***	***	***
Customer premises equipment----------	314	345	423
Cable, wire, and light-guide----------	***	***	***
Total 1/----------	***	***	***

1/ Because of rounding, figures may not add to totals shown.

As shown above, CPE has been the principal item purchased by the respondents, accounting for * * * percent of the total in each year; transmission equipment ranked second, accounting for * * * percent of purchases.

Estimates of total anticipated purchases for 1984 and average annual purchases for the periods 1984-88 and 1989-93, according to an extrapolation of anticipated purchases by respondents to the Commission's questionnaires sampled from 1,000 large corporations, 1/ are presented in the following tabulation (in millions of 1983 dollars):

Equipment type	1984	1984-88	1989-93
Transmission equipment--	294	263	300
Switching equipment-----	***	***	***
Customer premises equipment----------	2,977	4,233	2,037
Cable, wire, and light-guide----------	***	***	***
Total----------	***	***	***

The data indicate that anticipated purchases will increase during the short run (1984-88) but decline in the long term (1989-93). CPE and transmission equipment are the principal anticipated purchases, with CPE accounting for * * * percent and transmission equipment accounting for * * * percent during the three periods, respectively.

1/ The actual number of firms included in the Commission's questionnaire sample of 1,000 was 63 for 1984, 61 for 1984-88, and 51 for 1989-93.

The data on anticipated purchases, however, are subject to considerable variability. The following tabulation indicates the statistical variability (at the 95-percent confidence level) of the extrapolated sample of the 1,000 large corporations; the ranges of values (in millions of 1983 dollars) which have zero for a low had actual low values which were negative, as can be seen in the following tabulation:

Equipment type	1984		1984-88		1989-93	
	Low	High	Low	High	Low	High
Transmission equipment--	53	536	59	466	66	534
Switching apparatus-----	***	***	***	***	***	***
Customer premises equipment----------	1,239	4,715	0	10,069	53	4,021
Cable, wire, and light-guide----------	***	***	***	***	***	***
Total 1/----------	***	***	***	***	***	***

1/ The high-low range of total values reflects the confidence on total anticipated purchases; however, such totals do not reflect the sum of the 4 product categories.

Variability is also due to both market and nonmarket factors. In the area of market factors, new equipment such as digital PBX's and fiber optics contribute to uncertainty about the technological obsolescence of currently available equipment, especially analog equipment. Concerning the nonmarket factors, regulatory decisions by the FCC with regard to access charges and multiline telephone rates are sources of uncertainty--access charges because carriers which provide long-distance service have to pay such charges to local companies and, therefore, have to recover them in their rates, and multiline-telephone rates because the FCC has directed that multiline-telephone users, which are primarily businesses, have to pay additional charges beginning in June 1984. 1/ These and other sources of variability lead to projections of equipment subcategory or total anticipated purchases which have possible ranges of ± 100 percent; 2/ however, the projections for purchases of transmission equipment do not exhibit such extreme variability, and they increase over the long term. Since a microwave link between a large firm and a provider of long-distance service is a common technique for bypassing the local phone company and since projections of transmission equipment purchases increase over the long term, the potential for bypassing the local telephone companies appears to be increasing.

Selected Major Foreign Markets 3/

Overview

For the eight selected foreign markets previously discussed, aggregate consumption of all types of telecommunications equipment increased from

1/ Fortune, Apr. 16, 1984.

2/ The projected value is not statistically different from zero.

3/ In this section of the report, data on world statistics by major product class have been adjusted to reflect comparability of product data in other sections of this report.

$14.9 billion in 1978 to $21.6 billion in 1983, or by an average of 7.8 percent annually. The fastest growing market during 1978-83 was the United Kingdom, where consumption increased from $1.4 billion in 1978 to $3.0 billion in 1983, or by an average of 15.9 percent per year. The following tabulation outlines foreign consumption of telecommunications equipment, by major foreign telecommunications markets, in 1978 and 1983 and the associated average annual rate of growth as estimated by the Commission from U.S. Department of Commerce statistics:

Country	1978	1983	Average annual increase
	-----Million dollars----		Percent
West Germany	4,990.5	6,901.9	6.7
Japan	3,483.6	4,988.4	7.4
France	2,234.0	3,120.0	6.9
United Kingdom	1,442.3	3,019.2	15.9
Italy	1,103.0	1,471.9	5.9
Canada	920.5	1,224.4	5.9
Netherlands	455.9	541.8	3.5
Sweden	227.2	321.9	7.2
Subtotal	14,857.0	21,589.5	7.8
All other	9,904.7	14,392.3	7.8
Total	24,761.7	35,981.8	7.8

Of the four major product categories, the aggregate consumption of CPE during 1978-83 in the eight major foreign markets was the largest, increasing from $4.3 billion in 1978 to $6.7 billion in 1983. 1/ The market for CPE in individual countries ranged from a low in Sweden, whose consumption of CPE increased from $83.6 million in 1978 to $150 million in 1983, to a high in Japan, whose consumption increased from $1.1 billion in 1978 to $1.9 billion in 1983. France, West Germany, and the United Kingdom each had markets for CPE of $1.0 billion or more in 1983. The market for switching equipment in the eight countries was the second largest of the four major product groupings, totaling $3.9 billion in 1978 before increasing to $6.4 billion in 1983; West Germany was the largest market for these products in 1983, totaling $1.4 billion, and Sweden accounted for the smallest market, amounting to $87 million.

Markets for transmission equipment and cable, wire, and lightguide in the eight countries followed a trend similar to that of total telecommunications products, increasing from some $3.3 billion in 1978 to just over $4.2 billion in 1983. The country with the largest market in both product categories was West Germany, whose market for both transmission equipment and cable, wire, and lightguide totaled $2.1 billion in 1983. The second largest market in 1983 was Japan--accounting for $1.1 billion in transmission equipment and $926 million for cable, wire, and lightguide.

1/ App. H., tables H-1-H-5.

Canadian market

During 1978-83, the total Canadian market for telecommunications equipment decreased from $920.5 million in 1978 to $907.5 million in 1979 before increasing thereafter to $1.2 billion in 1983, representing an average annual increase of 5.8 percent. 1/ The largest product segment of the total market during this period was switching equipment, which averaged 36.3 percent of all equipment sold in Canada. Annual consumption of switching equipment followed a trend somewhat similar to that of total telecommunications products, decreasing from $335.0 million in 1978 to $325.0 million in 1979 before increasing to $435.5 million in 1983.

The Canadian market for CPE increased irregularly during 1978-83, from $285.3 million in 1978 to $364.2 million in 1983, or by an average annual rate of 5.0 percent. The combined market for transmission equipment and cable, wire, and lightguide--often considered collectively as one major product class--increased irregularly from $300.1 million in 1978 to $424.6 million in 1983, or by an average annual rate of 7.3 percent. Cable, wire, and lightguide averaged 50 percent of the two-product class during 1978-83.

Japanese market

The total Japanese market for telecommunications equipment decreased from $3.5 billion in 1978 to $3.4 billion in 1979 before increasing to $5.0 billion in 1983. 2/ During 1978-83, the average annual increase amounted to 7.4 percent. The single largest product segment of the market was accounted for by CPE, which averaged 37 percent of the total market during 1978-83; the market for CPE increased steadily from $1.1 billion in 1978 to $1.9 billion in 1983. 3/ Consumption of transmission equipment and cable, wire, and lightguide, collectively, decreased from $1.8 billion in 1978 to $1.5 billion in 1979 but increased steadily thereafter to $2.0 billion in 1983. Cable, wire, and lightguide averaged 46 percent of the two-product class during 1978-83. Consumption of switching equipment increased from $620.0 million in 1978 to $1.0 billion in 1983, or by an average annual rate of 11 percent.

United Kingdom market

In the United Kingdom, the total market for all types of telecommunications equipment increased from $1.4 billion in 1978 to $3.0 billion in 1983, averaging 16 percent annually. 4/ The two largest segments of the United Kingdom market during 1978-83 were switching equipment and CPE. Consumption of CPE grew from $584.7 million in 1978 to $1.3 billion in 1983, or by 16.5 percent annually. The growth of consumption of switching equipment during 1978-83 was the most pronounced of the product sectors, from $514.0 million to $1.3 billion, representing an average of almost 20 percent per year. Consumption of transmission equipment and cable, wire, and lightguide, collectively, increased from $343.6 million in 1978 to $557.0 million

1/ Ibid.
2/ Ibid.
3/ Transcript of hearing, p. 109, Apr. 24, 1984.
4/ Ibid.

in 1983, or by 10 percent annually. During the period, cable, wire, and lightguide accounted for an average of 68.8 percent annually of the total.

Swedish market

In Sweden, the market for telecommunications equipment increased steadily from $227.2 million in 1978 to $321.9 million in 1983, or by an average annual rate of 7.2 percent. 1/ The largest segment of the market during 1978-83 was CPE, which increased from $83.6 million to $149.9 million and accounted for an annual average of 42 percent of total equipment during the period. The markets for switching equipment and transmission apparatus (including cable, wire, and lightguide) increased from $63.8 million to $86.9 million and from $79.8 million to $85.0 million, respectively, during 1978-83. Cable, wire, and lightguide accounted for an annual average of 60.7 percent of the two-product grouping during 1978-83.

West German market

The total market for all types of telecommunications equipment in West Germany increased steadily during 1978-83, from $5.0 billion to $6.9 billion, or by 6.7 percent annually. 2/ Transmission equipment and cable, wire, and lightguide were the two largest product categories in the West German market during 1978-83. Collectively, this equipment accounted for an average of 60 percent of the total market during the period. The market for this equipment increased from $3.0 billion in 1978 to $4.2 billion in 1982, or by an average of 6.6 percent annually. Cable, wire, and lightguide accounted for 50 percent of the two-product category. Consumption of CPE in West Germany increased from $1.0 billion in 1978 to $1.4 billion in 1983, and the market for switching equipment increased from $1.0 billion to $1.4 billion.

Italian market

The Italian market for all types of telecommunications equipment rose from $1.1 billion in 1978 to $1.4 billion in 1980, decreased to $1.38 billion in 1981, and then rose to $1.5 billion in 1983. 3/ The largest segment of the Italian market during 1978-83 was switching equipment, which accounted for an annual average of 42 percent of the total market. Consumption of this product segment during 1978-83 increased uninterruptedly from $479.0 million to $656.1 million. CPE was the next largest market, which increased from $358.0 million in 1978 to $452.9 million in 1983. Transmission equipment and cable, wire, and lightguide together increased from $266 million in 1978 to $426.1 million in 1980 before dropping to $348.3 million in 1981. A modest recovery, however, was experienced for this equipment when the market reached $362.9 million in 1983. Cable, wire, and lightguide accounted for an average of 43 percent of the two-product class during 1978-83.

1/ Ibid.
2/ Ibid.
3/ Ibid.

French market

France's market for all types of telecommunications equipment increased steadily from $2.2 billion in 1978 to $3.1 billion in 1983, or by an average of 7 percent annually. 1/ The two largest product segments of the French market during 1978-83 were switching equipment and CPE. These segments grew at average annual rates of 12 and 6 percent, respectively. Consumption of switching equipment increased steadily from $750 million to $1.3 billion, and the market for CPE equipment grew irregularly from $756 million to $1.0 billion. French consumption of transmission equipment and cable, wire, and lightguide together fluctuated but generally increased from $728.0 million in 1978 to $800.0 million in 1983. Cable, wire, and lightguide accounted for an average of 50 percent of the two-product class during 1978-83.

Dutch market

The total market for telecommunications products in the Netherlands fluctuated during 1978-83 but generally increased from $455.9 million in 1978 to $541.8 million in 1983, or by an average of 3.5 percent annually. 2/ During 1978-83, the single largest product segment was CPE; consumption of these products vacillated but generally declined during the period, from $198.0 million in 1978 to $185.1 million in 1983, with a peak of $254.3 million in 1980. As a share of the total market for all telecommunications products, CPE decreased from 43.4 percent in 1978 to 34.2 percent in 1983.

Although not the largest, the fastest growing segment of the telecommunications market in the Netherlands was switching equipment, which increased steadily by an average annual rate of 8.5 percent, from $145.0 million in 1978 to $217.6 million in 1983. Collectively, transmission equipment and cable, wire, and lightguide increased irregularly from $112.9 million in 1978 to $139.0 million in 1983. Cable, wire, and lightguide averaged 74 percent of the two-product grouping during 1978-83.

Position of U.S. firms

Total U.S. exports of all types of telecommunications equipment increased from $748.5 million in 1978 to $1.3 billion in 1983, or by an average annual rate of 4.6 percent. 3/ Despite this increase, U.S. exports as a share of foreign consumption in recent years did not exceed 4 percent; the ratio rose from 3.0 percent in 1978 to 3.7 percent in 1983. The product segment of foreign consumption of which U.S. exports captured the greatest share was CPE, which averaged 4.8 percent during 1978-83. On average, U.S. exports of transmission equipment accounted for only 1.8 percent of total foreign consumption during this period. Significant markets for U.S.-produced telecommunications equipment in 1983 included Korea, Canada, the United Kingdom, and Saudi Arabia. Such markets accounted for 14, 12, 9, and 7 percent, respectively, of total U.S. exports of telecommunications

1/ Ibid.
2/ Ibid.
3/ App. H, tables H-6-H-10.

equipment. Exports of switching equipment increased most rapidly during 1978-83, from $199.7 million to $533.9 million, or by an average of 21.7 percent annually. In 1983, exports of switching equipment amounted to 40 percent of total exports, compared with 14 percent in 1978. Korea was by far the largest export market in 1983 for this equipment, accounting for 28 percent of total U.S. exports of these products. During 1978-83, exports of transmission equipment, CPE, and cable, wire, and lightguide increased by an average annual rate of 15.3 percent ($72.6 million to $148.1 million), 9.5 percent ($314.6 million to $495.0 million), and 0.4 percent ($161.6 million to $164.7 million), respectively.

In 1983, the largest markets for exports of U.S.-made transmission equipment were the United Kingdom ($19.3 million), Canada ($18.0 million), and Mexico ($10.4 million). Collectively, exports to these countries accounted for 32 percent of total U.S. exports of transmission equipment in 1983. The two largest markets for exports of CPE in 1983 were Canada and the United Kingdom. Exports to these countries in 1983 amounted to $66.5 million (13 percent of the total) and $52.9 million (10.7 percent of the total), respectively. Egypt, Canada, and the United Kingdom were the largest markets for U.S.-made cable, wire, and lightguide in 1983; exports to these countries amounted to $27.5 million, $23.1 million, and $21.2 million, respectively. Collectively, U.S. exports to these countries accounted for 43.6 percent of total exports of such equipment in 1983.

Position of foreign firms

Of the eight selected foreign markets studied, the Netherlands had the highest level of import penetration in 1980. 1/ This ratio was 56.7 percent (table 10). The major source of such imports was West Germany, which accounted for 34 percent of total imports of telecommunications equipment into the Netherlands. Exports from the Netherlands accounted for 67.7 percent of Dutch shipments (the second highest ratio of the countries studied).

Sweden had the next highest import penetration in 1980, amounting to 45.2 percent of consumption. The major sources of such imports were West Germany, Finland, and Norway. These countries accounted for 17, 12, and 11 percent, respectively, of total imports of such equipment into Sweden. Swedish exports amounted to 81.0 percent of their shipments. In both the Netherlands and Sweden there is one major producer which has focused its attention on export markets rather than relying heavily on the home market.

In Canada, the import penetration was 43.0 percent in 1980. The major source of such imports was the United States. The primary reason for this high import penetration ratio is that there are two U.S. producers, (GTE and Northern Telecom) each of which supply to affiliated telephone companies in Canada. GTE supplies to the Anglo-Canadian Telephone Co., the British Columbia Telephone Co., and the Quebec telephone Co., all of which are subsidiaries of GTE. Northern Telecom supplies to its parent company, Bell Canada, which controls the majority of Canada's telephone companies. Northern Telecom is based in Canada. Exports from Canada mounted to 52.0 percent of shipments in 1980,

1/ 1980 is the most recent year for which comparable data for all countries are available.

Table 10.--Telecommunications equipment: 8 selected foreign markets for telecommunications equipment, shipments, exports, imports, and apparent consumption, by major sources of imports, 1980

Country	Shipments	Exports	Imports	Apparent consumption	Ratio of--		Major source(s) of imports	Percent of total imports accounted for by major source(s)
					Imports to consumption	Exports to shipments		
	Million dollars				Percent			
West Germany	6,610.5	1,917.5	988.6	5,681.6	17.4	29.0	Belgium/Luxembourg	14
							Netherlands	14
Japan	4,602.3	873.9	46.5	3,774.9	1.0	19.0	United States	46
United Kingdom	2,938.5	518.0	299.0	2,719.5	11.0	17.6	France	29
France	2,656.2	398.9	209.7	2,467.0	8.5	15.0	United States	24
							West Germany	20
Italy	1,502.3	326.6	271.1	1,446.8	18.7	21.7	West Germany	30
Canada	1,136.9	592.1	410.9	955.7	43.0	52.0	United States	27
Netherlands	830.5	562.2	351.4	619.7	56.7	67.7	West Germany	34
Sweden	846.3	685.1	133.0	294.2	45.2	81.0	West Germany	17
							Finland	12
							Norway	11

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce and information from Department of State Airgrams.

which is indicative that the domestic market is relatively small and Canadian companies rely to a large extent on selling their products abroad.

Italy, West Germany, and the United Kingdom each had import penetrations of between 10 and 20 percent. The major foreign source of telecommunications equipment in Italy was West Germany, which accounted for 30 percent of total Italian imports in 1980. Italian exports stood at 21.7 percent of the shipments. In West Germany, the import penetration amounted to 17.4 percent in 1980, with the major sources of such imports being Belgium/Luxembourg and the Netherlands; imports from these two sources amounted to 28 percent of total West German imports. West German exports were 29.0 percent of their shipments. In the United Kingdom, imports in 1980 amounted to 11.0 percent of consumption, and exports amounted to 17.6 percent of shipments. The major source of United Kingdom imports was France, which accounted for 29 percent of all such imports in 1980.

Major domestic producers in the United Kingdom, West Germany, and Italy have to some degree gone beyond their borders to supply equipment, in many cases to the Third World. This has provided more opportunities for foreign producers to export to these markets.

The last two countries, Japan and France, are examples of more closed markets. In 1980, the import penetration ratio was 1.0 percent in Japan and 8.5 percent in France. The major source of imports into Japan was the United States, which accounted for 46 percent of total imports of telecommunications equipment. The United States was also the largest foreign supplier to the French market in 1980, accounting for 24 percent of total imports. Imports from West Germany accounted for 20 percent of total imports into France in that year. The ratio of exports to shipments in Japan was 19.0 percent in 1980, reflecting a concerted effort on the part of several major producers to penetrate foreign markets. French producers, on the other hand, have not fared so well in foreign markets. The ratio of exports to shipments in France in 1980 was 15.0 percent, the lowest of the eight countries studied.

Competitive assessment of U.S. products in foreign markets

In all the foreign markets studied, namely Canada, Japan, the United Kingdom, France, Netherlands, West Germany, Sweden, and Italy, price appeared to be of less importance than other factors, particularly in sales to the respective PTT or telephone company. It appeared that the orders were made according to the relationship between the PTT or telephone company and the manufacturer.

In some cases, particularly in Canada and the United States, the telephone company is (or traditionally was) affiliated with the preeminent domestic manufacturer. In most other cases, the PTT is a Government agency or Government corporation, which for political reasons has vested interests in maintaining close relationships with domestic manufacturers. PTT's have various ways of insuring the protection of domestic manufacturers. Often there is a predetermined market share which is automatically allocated to domestic producers, as in West Germany. 1/ In the United Kingdom, bids for

1/ Organization for Economic Cooperation and Development, Telecommunications: Pressures and Policies for Change, 1983, p. 38.

equipment are only solicited from a list of approved suppliers. 1/ Market share remains relatively stable in the United Kingdom. In Japan, Sweden, and the Netherlands, preeminent producers work closely with respective PTT's on telecommunication plans and joint R. & D. projects, thus insuring a competitive edge for domestic manufacturers. In France, the major suppliers have recently been nationalized, assuring close ties between the PTT and domestic producers.

With regard to the compatibility of products, in a general way, most products in most countries are intended to be compatible, in the sense that most countries are members of the International Telecommunications Union (ITU) and subscribe to standards issued by ITU's International Telegraph and Telephone Consultative Committee (CCITT). These standards are very basic, though, and do not preclude individual countries from establishing more restrictive standards, which they have done.

According to most sources, the overriding factors determining contract awards are quality and domestic content. If there are quality producers in a given country, the PTT is reluctant to purchase abroad. Companies that have managed to gain strongholds in foreign markets have generally followed one of the following strategies. One way to penetrate foreign markets is to set up subsidiary manufacturing plants in the targeted country. Two U.S.-based companies have been successful with this method. Another strategy is to export to markets where there are not established domestic producers. Two European manufacturers have been successful at that approach.

In assessing the competitiveness of U.S.-made products in selected foreign countries, U.S. producers of telecommunications equipment were asked to compare U.S.-made products and locally produced equipment in each specified country on an overall basis and with various rating factors, by product groupings and by specified countries. The resulting frequency distributions are included in appendix K, tables K-8-K-14.

Japan.--In all product categories except data display terminals, a majority of U.S. producers felt that the Japanese products had the overall competitive edge. With data display terminals the responses were evenly split--four for four. For individual rating factors the responses varied, with Japanese-made products having the overwhelming edge in price, financing terms, and historical supplier relationships. Responses for other rating factors were small in number and varied. When asked if they thought these comparative advantages would change in the short and long term, most thought that they would not. Many of those who thought that the situation would change elaborated on the bilateral agreement between the United States and Japan and anticipated that the U.S.-made products would most likely become more competitive in the Japanese market than they had been in the past.

West Germany.--For switching equipment, including central office switches, telephone sets, PBX's, and key systems, a majority of the respondents felt that U.S.-made products had the overall competitive advantage over West German-made equipment in the West German market. For data display terminals, cable, wire, and lightguide, the responses were split evenly; for the other product categories, West German products were considered to have the overall advantage. With the individual rating factors the results are mixed.

1/ Ibid.

For virtually every product group, the unanimous response of "No" was given to the question of whether these producers expected a change in the competitive situation of U.S. products in West Germany in the short and long term.

Canada.--For all product categories except key systems switching equipment, U.S. producers that responded indicated that they felt that U.S.-made products had the competitive edge in the Canadian market. Some of the most frequently cited reasons for this preference included availability of products, service, superior design, and historical supplier relationship. When asked if they felt that these conditions would change in the short term or long term, by far the more popular answer was no.

United Kingdom.--For the overall competitive advantage of the various product groupings, the responses were mixed. For transmission equipment and CPE (total), a majority of those who responded indicated that products made locally in the United Kingdom were overall more competitive than those made in the United States. For PBX's and cable, wire, and lightguide the responses were split evenly between domestic and foreign product. For the individual rating factors, the responses were mixed. One very consistent response, however, was that the U.S.-made products were of superior design. When the producers were asked if they expected the situation to change in the short or long term, the bulk of the responses was no. For some companies that answered affirmatively, the reason given was that they felt that the imminent privatization of British Telecom will foster increased competition and that U.S. products will become increasing more competitive in the United Kingdom market.

France.--With the exceptions of telephones, key systems, cable, wire, and lightguide, a majority of those responding indicated that French products had the overall competitive advantage over the U.S. products in the French market. Although the responses to the individual rating factors varied, compatibility with existing systems, historical supplier relationships, and favorable financing terms were fairly consistently given as reasons why the French products were more competitive than U.S.-made products in France. For almost all product categories, producers answered that they felt that these conditions were not expected to change in the short or long term.

Netherlands.--For every product group, U.S. producers that responded indicated that U.S.-made products were overall at least as competitive if not more competitive than Dutch-made products in the Netherlands. In general, U.S. producers felt that U.S. products had a superior design, but that Dutch-made products were more competitive in the area of historical supplier relationships. All producers that responded for each product category indicated that they did not expect these trends to change in the short or long term.

Sweden.--The responses from reporting producers varied by product category for that type of equipment (domestic or Swedish) which had the overall competitive advantage in Sweden. In transmission equipment and data display terminals, a majority of U.S. producers felt that the U.S.-made products were overall more competitive in the Swedish market. For key systems, the responses were split evenly. For all other types of equipment, responding U.S. producers indicated that Swedish products were more

competitive. Responses to the individual rating factors varied, and no trend is discernible. It was almost unanimous that these conditions are not expected to change in the short or long term.

The World Industry

In January 1982 there were 285.7 million subscriber telephone lines in service throughout the world (table 11), representing an increase of 80 percent over the 158.8 million lines in 1971. 1/ The United States had the largest number of subscriber lines of any country in both years. The number of lines in the United States increased from 72.1 million to 105.4 million, or by 46 percent, during 1971-82. As a share of the world total, however, the number of subscriber lines in the United States decreased from 45 percent in January 1971 to 37 percent in January 1982 as other countries (previously with fewer lines) increased the number of lines in service faster than did the United States (fig. 3).

The country with the second largest number of telephone lines in 1971 and 1982 was Japan. That number increased from 17.6 million in 1971 to 40.3 million in 1982, or by 129 percent. Other significant users of telecommunications systems included West Germany, with 10.0 million lines in 1971, increasing to 21.8 million in 1982; the United Kingdom, with 9.9 million lines in 1971 compared with 18.9 million in 1982; France, with 5.6 million lines in 1971 increasing to 17.3 million in 1982; and Italy, with 5.7 million lines in 1971 increasing to 12.5 million in 1982. Canada, Spain, the Netherlands, and Sweden also had substantial telecommunications industries in 1971 and 1982.

Table 11.--Telephone subscriber lines in service, by countries, 1971 and 1982

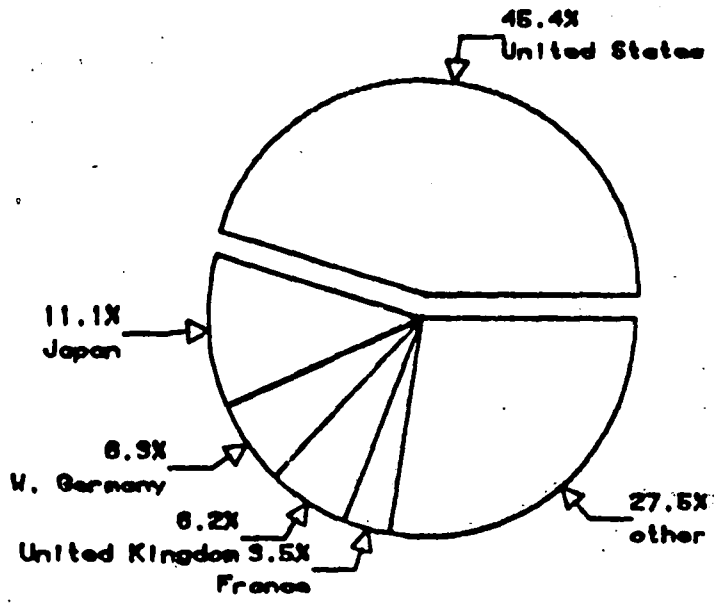
(In thousands of lines)

Country	1971	1982
United States	72,131	105,436
Japan	17,576	40,276
West Germany	9,961	21,753
United Kingdom	9,878	18,878
France	5,616	17,290
Italy	5,715	12,453
Canada	5,657	9,651
Spain	2,762	7,429
Netherlands	2,216	5,068
Sweden	3,199	4,895
All other	24,121	42,594
Total	158,832	285,723

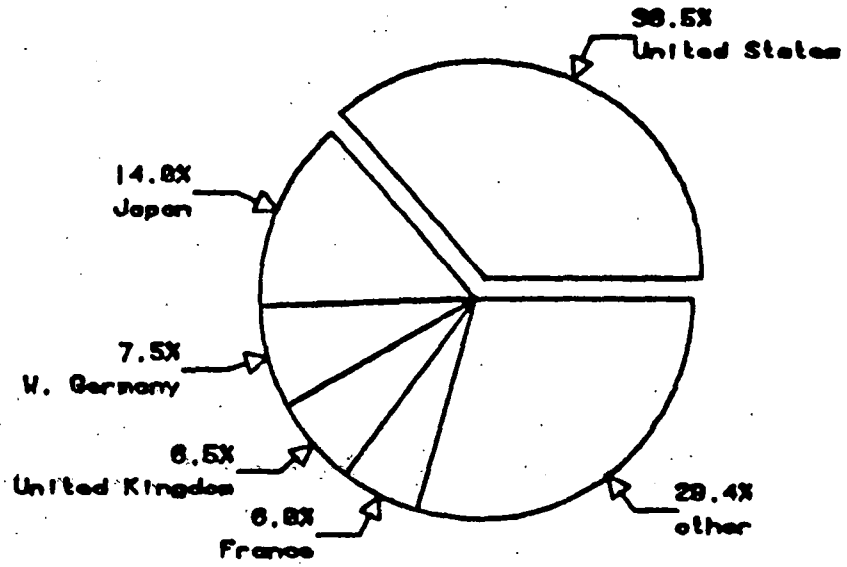
Source: A.T. & T., The World's Telephones, 1982.

1/ The number of subscriber lines is an important yardstick used to evaluate the size of the telecommunications industry.

Figure 3.--TOTAL TELEPHONE SUBSCRIBER LINES IN SERVICE, BY COUNTRY, 1971 AND 1982



1971



1982

In 1981, there were 192 million telephone instruments in operation in the United States. This number represented 38 percent of the more than 0.5 billion telephones in service worldwide. In the United States the telephone systems are privately owned and operated, whereas in most other countries the telecommunications systems are owned and operated by the governments. The following tabulation shows the number of telephones privately operated and Government operated in the United States and in the rest of the world in 1982 according to All World's Telephones, a 1983 publication by A.T. & T.:

Area	Total	Privately operated telephones	Government-operated telephones	Ratio of government-operated telephones to total
	1,000 units			Percent
United States	191,595	191,400	195	0.1
World less United States	316,691	61,334	255,242	80.6

In 1982, the top 13 world manufacturers are estimated to have together controlled about 73 percent of world sales of telecommunications equipment. 1/ A prominent U.S. producer was the leading supplier, accounting for about * * * percent of total sales. Another U.S.-based company was the second largest supplier, selling about * * * percent of all telecommunications equipment. A West German firm ranked third, with about * * * percent. A large Swedish company ranked fourth, with about * * * percent, and the other major producers together accounted for about * * * percent of all telecommunications equipment sold wordwide. U.S. companies worldwide accounted for almost 40 percent of worldwide sales of telecommunications equipment, 2/ and U.S. based firms supplied 32 percent.

The U.S. Industry

Size and structure

The U.S. industry producing telecommunications equipment grew from about 380 firms in 1978 to approximately 550 firms in 1983. The firms range in size from small suppliers of subassemblies to the largest manufacturer in the United States and the world. Most of the growth occurred as small firms entered the industry, but significant growth is the result of established manufacturers of radio-type and computer-type equipment supplying their product lines to the telecommunications markets.

1/ Includes principally the traditional wire-type telecommunications (telephone and telegraph) apparatus; does not necessarily include radio, satellite, data, or other, less traditional systems.

2/ Fortune, May 3, 1982, pp. 258-286 and Aug. 23, 1982, pp. 181-184.

As the size of the telecommunications industry has increased, the structure has broadened to accommodate the operation of an increasing number of regulated common carriers and private networks which compete with the entrenched networks. The marketplace need for services more advanced than those available over the public switched network, as well as the move to open competition in the marketplace, has created an explosive demand for new products. The increased use of microwave transmission in space and in light guide has permitted more information to be carried on the networks and has fostered new designs for transmission, switching, and terminal equipment, much of it incorporating computer-type and radio-type apparatus. The principal expansion of the structure was (and continues to be) in these types of apparatus, although a large expansion in the lightguide producing industry is anticipated.

The increased use of computer techniques with concomitant software requirements has raised the skill level necessary to install and service telecommunications equipment, not to mention closer liaison with the purchaser/user. As competition has intensified, foreign firms established manufacturing and service facilities in the United States in order to compete effectively, particularly in private branch exchanges but also in central office switches, terminal equipment and transmission apparatus. Many new firms capable of installing and servicing networks for private concerns were formed and graduated into manufacturing some telecommunications equipment.

Industry concentration

Of the firms responding to the Commission's questionnaire, five firms in each of four market segments (not necessarily the same five firms) accounted for a substantial share of domestic shipments in 1981 and 1983. Shown in the tabulation below are the percentage shares of domestic shipments accounted for by the top five firms in each of the indicated markets:

	Transmission equipment	Switching apparatus	Customer premises equipment	Cable, wire, and lightguide	All products
1981-----	94	100	91	100	88
1983-----	92	100	88	100	86

Firms producing switching apparatus and cable, wire, and lightguide did not changed appreciably during 1981-83; however, the concentration in firms producing transmission equipment and customer premises equipment has dropped as firms which formerly dominated production of those products lost market share to firms with faster rising shipments. Information gathered by the Commission about future concentration is not conclusive; however, a lessening of concentration appears to be the trend.

One of the major determinants of industry concentration prior to the divestiture of the Bell operating companies from A.T. & T. was the organization of A.T. & T. and the virtual captive market represented by the operating companies. (The company serviced exclusively about 85 percent of the

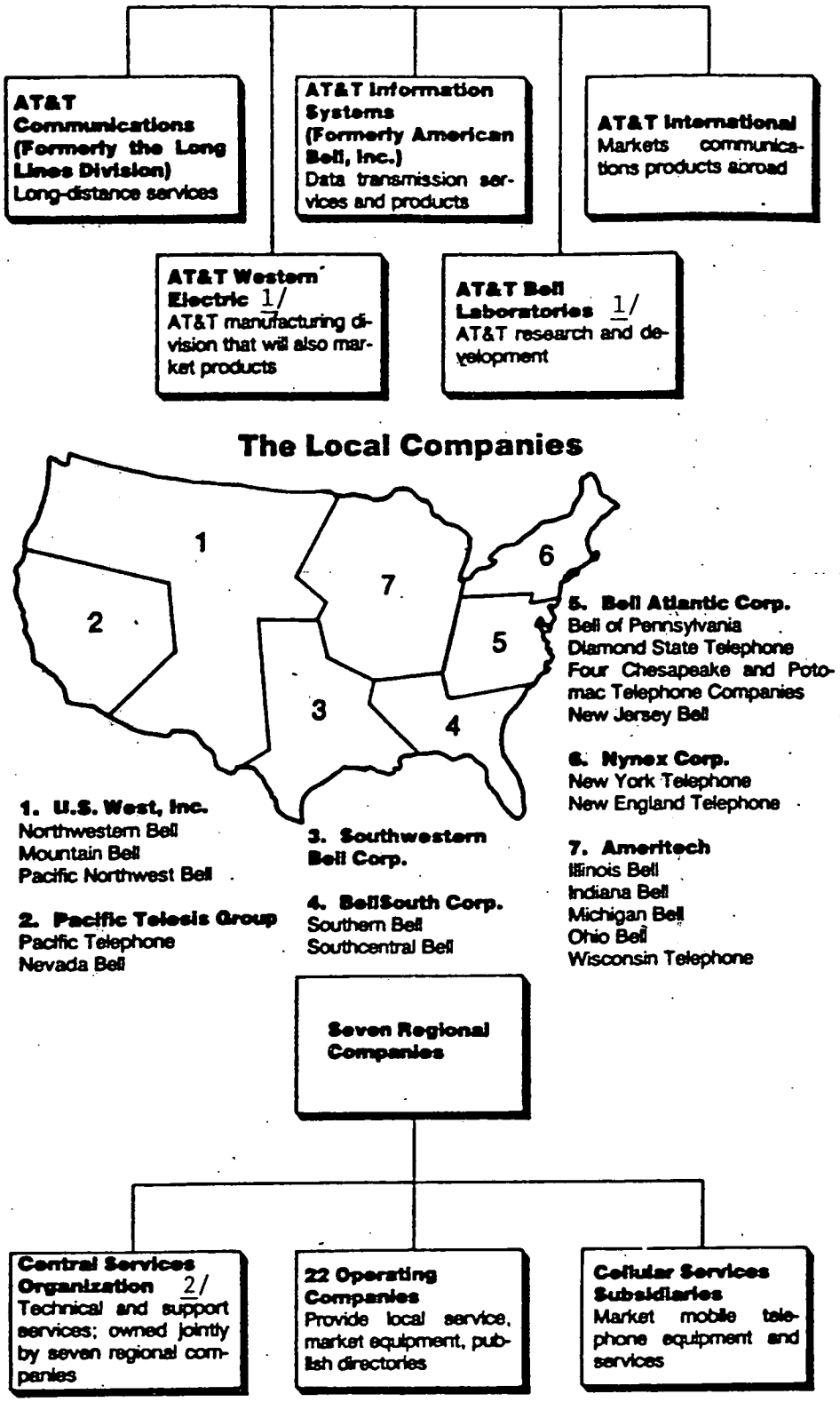
telephones in the United States.) The captive demand for telecommunications equipment resulting from this affiliation required very large manufacturing capacity. Prior to January 1, 1984, all of the service-producing, manufacturing, and research organizations and the local operating companies were a part of A.T. & T. As of January 1, 1984, the local operating companies were divested from A.T. & T. and were organized into seven regional holding companies which own the 22 Bell operating companies and Bell Communications Research, an organization setup to insure the technical compatibility of equipment used by the local operating companies (fig. 4). A.T. & T. was also reorganized and kept the long-distance service, Western Electric, several data service and marketing divisions, and Bell Laboratories. The effect of divestiture was to separate the local operating companies, the primary purchasers of the equipment, and Western Electric, the primary manufacturer. This separation now allows the local operating companies to purchase equipment from any manufacturer, not just Western Electric.

The divestiture also separated the long-distance service from the local service, with A.T. & T., in addition to other firms providing the former and the local operating companies providing the latter. * * *. Other major manufacturers competed principally for the independent telephone company market.

Domestic shipments

The value of domestic shipments reported to the Commission during 1981-83 by U.S. producers was * * * of the * * * reported in 1983 (table 12). Of the major product groupings, shipments of transmission equipment decreased in value by * * *, central office switches increased by * * *, CPE fluctuated, rising by 9 percent to $5.3 billion in 1982, before falling by 1 percent to $5.2 billion in 1983, and cable, wire, and lightguide * * * in 1983. The activity in transmission equipment and switching apparatus is attributed to short-term variations in construction budgets and uncertainty on the part of many of the major producers. In the case of CPE, significant variations occurred in subgroupings reflecting market conditions. The value of domestic shipments of telephone sets dropped by * * * in 1983 in the face of strong import competition. In contrast, the value of PBX's rose by 47 percent to $1.2 billion, and data terminals rose by * * * reflecting consumer demand for products to reduce costs in the case of PBX's and to enhance data transmission and retrieval in the case of data terminals. The * * * shipments of cable, wire, and lightguide appears to be * * *.

Figure 4.-- **AT&T After Divestiture.**



1/ AT&T Western Electric and AT&T Bell Laboratories were consolidated under AT&T Technologies in 1984.

2/ Changed to Bell Communications Research in 1984.

Source: Computerworld on Communications.

Table 12.--Telecommunications equipment: U.S. producers' domestic shipments, by product groups, annual 1981-83, and anticipated averages, 1984-88 and 1989-93 1/

(In thousands of dollars)

Product	1981	1982	1983	1984-88	1989-93
Transmission equipment (total)	***	***	***	***	***
Switching equipment (total)	***	***	***	***	***
Class 5 central office switches	***	***	***	***	***
Customer premises equipment (total) 2/	4,846,523	5,268,808	5,209,213	7,859,917	***
Telephone sets	***	***	***	***	***
Private branch exchanges	811,791	929,739	1,193,186	1,535,202	***
Key system switching equipment	***	***	***	***	***
Data display terminals	***	***	***	***	***
Cable, wire, and lightguide (total)	***	***	***	***	***
Total, all products	***	***	***	***	***

1/ Data were not supplied in all categories by all respondents due to their inability to provide the information requested. Thus, data for the four major types of equipment may not add to totals for all products.

2/ Note that the data for the four types of CPE identified here may not add to the CPE total (data were not collected on "all other" CPE).

Source: Compiled from responses to questionnaires of the U.S. International Trade Commission.

According to responses to the Commission's questionnaires, a significant change in the types of customers purchasing domestic shipments of telecommunications equipment occurred during 1981-83. In 1981, regulated common carriers accounted for * * * percent of the value of domestic shipments compared with * * * percent in 1983, as shown in the following tabulation (in percent):

Product	1981	1983
Transmission equipment (total)----------	***	***
Switching equipment (total)----------	***	***
Class 5 central office switches-------	***	***
Customer premises equipment (total)-----	***	***
Telephone sets----------	***	***
Private branch exchange----------	***	***
Key system switching equipment--------	***	***
Data display terminals----------	***	***
Cable, wire, and lightguide (total)-----	***	***
Total, all products----------	***	***

Regulated common carriers accounted for the bulk of the consumption of transmission equipment and switching apparatus without significant change, during 1981-83. Customer premises equipment * * * percent. * * *.

Estimates of future shipments to regulated common carriers supplied by the respondents to the Commission's questionnaire were not conclusive, since many firms, large and small, were unable to estimate their annual shipments during 1984-88 and 1989-93. The uncertainty rested for the most part on the effects of legislative and regulatory actions pending and possible. Generally, most firms projecting short- and long-term shipments predicted increasing shipments in all categories, with the share of customer premises equipment and cable, wire, and lightguide shipped to regulated common carriers * * *.

U.S. producers of telecommunications were requested to comment with regard to the reasons for future changes predicted in their shipments other than regulated common carriers. The suggested reasons presented to the respondents were (1) increased competitiveness of imports and (2) increased competitiveness of competing U.S. products. All respondents reported that these suggested reasons had no bearing on their shipments to users and offered no alternative reason.

Exports

U.S. exports of telecommunications equipment were reported by respondents to the Commission's questionnaire to have increased by 31 percent from $814 million in 1981 to $1,066 million in 1983, reaching $1,115 million in 1982 (table 13). Exports increased in all major categories except cable, wire, and lightguide, which * * * percent to * * * million in 1983 in the absence of major foreign contracts. * * * exports of transmission equipment increased by 71 percent to $347 million, switching apparatus, by * * * percent to * * * and CPE rose by about 1 percent to $387 million as a result of contracts in Korea, Saudi Arabia, and Egypt and generally increasing exports to Canada and the United Kingdom.

Table 13.--Telecommunications equipment: U.S. producers' exports, by product groups, annual 1981-83, and anticipated averages, 1984-88 and 1989-93 1/

(In thousands of dollars)

Product	1981	1982	1983	1984-88	1989-93
Transmission equipment (total)	203,029	225,621	346,955	252,400	***
Switching equipment (total)	***	***	***	***	***
Class 5 central office switches	***	***	***	***	***
Customer premises equipment (total) 2/	382,164	457,768	386,760	369,109	***
Telephone sets	***	***	***	***	***
Private branch exchanges	89,286	101,297	90,006	100,630	***
Key system switching equipment	***	***	***	***	***
Data display terminals	227,839	273,222	229,863	185,329	***
Cable, wire, and lightguide (total)	***	***	***	***	***
Total, all products	814,216	1,115,010	1,065,996	1,378,049	***

1/ Data were not supplied in all categories by all respondents due to their inability to provide the information requested. Thus, data for the four major types of equipment may not add to the totals for all products.

2/ Note that the data for the four types of CPE identified here may not add to the CPE total (data were not collected on "all other" CPE).

Source: Compiled from responses to questionnaires of the U.S. International Trade Commission.

As reported by respondents to the Commission's questionnaires, the ratio of the value of U.S. exports as a share of U.S. producers' shipments increased from 6.5 percent in 1981 to 8.3 percent in 1983, as shown in the following tabulation (in percent):

Product	1981	1983
Transmission equipment (total)	***	***
Switching equipment (total)	***	***
Class 5 central office switches	***	***
Customer premises equipment (total)	***	***
Telephone sets	***	***
Private branch exchanges	***	***
Key system switching equipment	***	***
Data display terminals	***	***
Cable, wire, and lightguide (total)	***	***
Total, all products	***	***

The trend for 1981-83 shows strong increases in exports of transmission equipment and switching apparatus as a share of U.S. producers' shipments. Most other product categories show a negative short-term trend. These trends reflect the success of U.S. exporters in high-technology products and the competition of foreign suppliers in foreign markets.

U.S. exporters that reported their short- and long-term * * * to the Commission were optimistic in all major product categories except transmission equipment in the short term. Their reports on long-term trends were unreliable in that many exporters were unable to estimate their values of average annual exports during 1989-93.

U.S. exporters were requested in the Commission's questionnaire to comment on the reasons for their predictions on their value of expected exports during the short-term (1984-88) and long term (1989-93). Their responses are shown in the following tabulation:

Item	1984-88		1989-93	
	Yes	No	Yes	No
Are changes in exports predicted on increased competitiveness of foreign exporters?----------	11	19	8	19
Are changes in exports predicted on increased competitiveness of other U.S. firms?----------	8	22	7	20

The firms concerned about the increased competitiveness of foreign exporters generally cited the spread of technology and the lower costs experienced by foreign producers allowing them to be lower in price. Some firms also cited standards, foreign export incentives, foreign government subsidies, and government/business ties as reasons for moderating their expectations. Only a few respondents mentioned the effects of A.T. & T.'s entry into the export markets; however, the exporters generally reported the increased competitiveness of U.S. firms in foreign markets and larger foreign markets (particularly in the Third World Countries.)

Capacity and capacity utilization

U.S. manufacturers reported to the Commission on their annual capacity to produce telecommunications equipment using their 1980 operations as an index of 100. A few declines from the index of 100 were reported, but many firms reported huge increases, reflecting the expectations of small firms with intentions of rapid expansion. Because of the wide variation in the size of the reporting firms, the median in the expected change of annual capacity is shown in table 14 as an indication of the historical short-term growth and expected short- and long-term growth.

Table 14.--Telecommunications equipment: Median index of annual capacity reported by U.S. producers, by products, annual 1981-83, and anticipated averages, 1984-88 and 1989-93 1/

(1980 capacity=100)

Product	1981	1982	1983	1984-88	1989-93
Transmission equipment (total)	110	111	113	150	***
Switching equipment (total)	***	***	***	***	2/
Class 5 central office switches	***	***	***	***	2/
Customer premises equipment (total)	100	106	120	155	***
Telephone sets	100	100	118	165	***
Private branch exchanges	100	127	132	180	2/
Key system switching equipment	100	80	115	115	2/
Data display terminals	109	122	121	135	***
Cable, wire, and lightguide (total)	***	***	***	***	***
All products	109	120	120	160	***

1/ Data were not supplied in all categories by all respondents due to their inability to provide the information requested.

2/ Not meaningful because of insufficient reporting.

Source: Complied from responses to questionnaires of the U.S. International Trade Commission.

In nearly every category the median shows historical and expected growth in the capacity to produce in all categories of telecommunications monitored. Although confidence is lacking in the 1984-88 and 1989-93 reports owing to the inability of some U.S. manufacturers to report anticipated capacity, the reporting manufacturers were optimistic about the demand for telecommunications equipment in the future. In the case of switching equipment, private branch exchanges, and key systems switching equipment, however, there is uncertainty about the changes technological development may bring; reporting was meager and spotty for those products.

In reporting capacity utilization to the Commission, manufacturers presented a variety of views on their manufacturing operations. Several manufacturers not producing certain product groups during 1981-83 reported entry into those product lines after 1983. The median of capacity utilization reported by respondents is shown in table 15.

Table 15.--Telecommunications equipment: Median annual capacity utilization reported by U.S. producers, by products, annual 1981-83, and anticipated averages, 1984-88 and 1989-93 1/

(Percent)

Product	1981	1982	1983	1984-88	1989-93
Transmission equipment (total)	84	82	87	90	***
Switching equipment (total)	***	***	***	***	2/
Class 5 central office switches	***	***	***	***	2/
Customer premises equipment (total)	68	62	70	83	***
Telephone sets	82	83	84	89	***
Private branch exchanges	60	66	75	85	***
Key system switching equipment	62	48	73	83	2/
Data display terminals	70	55	58	87	***
Cable, wire, and lightguide	***	***	***	***	***
All products	75	75	72	85	***

1/ Data were not supplied in all categories by all respondents due to their inability to provide the information requested.

2/ Not meaningful because of insufficient reporting.

Source: Compiled from responses to questionnaires of the U.S. International Trade Commission.

As in the reporting on capacity, reports on capacity utilization show uncertainty about the future of switching equipment, PBX's, and key systems switching equipment. In addition, the reports on CPE are strongly optimistic in the future compared with those for 1981-83. Contrary to the opinions of many industry sources, responses to the Commission's questionnaire show not only increased capacity, but also increased capacity utilization in the future. This information leads to the conclusion that much of the data reported reflect small and growing firms with high expectations.

Employment

Total employment in U.S. firms producing telecommunications equipment in 1983 decreased irregularly by less than * * * percent, to * * * persons. However, as the reporting firms diversified, the number of production and related workers engaged in the production of telecommunications equipment diminished by * * * percent in absolute terms, from * * * in 1981 to * * * in 1983, and as a share of total employment, from * * * to * * * percent (table 16).

Table 16.--Average number of employees, total employees and production and related workers engaged in the manufacture of telecommunications equipment, annual 1981-83, and anticipated average, 1984-88 and 1989-93 1/

Item	1981	1982	1983	1984-88	1989-93
Average number employed in the reporting establishment(s):					
All persons	***	***	***	***	***
Production and related workers engaged in the production of telecommunications equipment	***	***	***	***	***
Average hours worked by production and related workers in the production of telecommunications equipment	1,932	1,896	1,896	2,148	***
Total wages paid to production and related workers for telecommunications products 1,000 dollars	***	***	***	2/	2/

1/ Data were not supplied in all categories by all respondents due to their inability to provide the information requested.

2/ Data were not reported.

Source: Complied from responses to questionnaries of the U.S. International Trade Commission.

The average number of manhours worked per person was steady at about 1,900 hours per year, and the average worker's income increased from * * * per year in 1981 to * * * in 1983. Output (domestic shipments plus exports) per production and related employee increased from * * * in 1981 to * * * in 1983. Reporting firms show an anticipated rise to an annual average employment of * * * workers in 1984-88, and the number of manhours worked per year indicate overtime operations. For the period 1989-93, many firms did not report due to their inability to project that far in the future.

Capital expenditures

Capital investment in the United States reported by U.S. producers of telecommunications equipment show heavy investment in machinery for their U.S. manufacturing facilities, increasing from * * * million in 1981 to * * * million

in 1983. Average annual expenditures for machinery during 1984-88 are anticipated to rise to $1,372 million (table 17). Insufficient reporting renders data for 1989-93 meaningless. Expenditures for both land and land improvements and buildings and leasehold improvements fell to a low in 1982 and 1983, but a significant rise in investment to near or above 1981 levels is anticipated as an annual average during 1984-88.

Foreign investment by U.S. producers is small compared with U.S. investment, but an increase is shown during 1981-83 and anticipated investment during 1984-88 in foreign countries is predicted to increase sharply. In 1983, U.S. investment overseas in buildings and leasehold improvements was reported at * * * representing only * * * percent of that type of expenditure in the United States; however, during 1984-88, the average annual investment is anticipated to * * * million, just over * * * percent of the value anticipated to be invested in comparable U.S. facilities. Foreign investment by U.S. firms follows the same trend, increasing from * * * million in 1983 to an anticipated annual average of * * * million during 1984-88. The data, therefore, indicate that increased foreign investment by U.S. producers will keep pace with domestic investment but at a much lower level.

U.S. producers were requested in the Commission's questionnaire to report if an improved production environment in the United States and in foreign countries were reasons for any expected changes in their capital expenditures; those who responded gave answers as shown in the following tabulation:

Item	Yes	No
Are expected changes in the United States predicated on an improved environment for production in the United States?	7	24
Are expected changes in foreign countries predicated on an improved environment for production in foreign countries?	2	24

Although most respondents determined that their changes in capital expenditures were not the result of an improved production climate in the United States or in foreign countries, some respondents provided instructive comments. Those determining that the production environment improved in the United States cited the breakup of A.T. & T., the investment tax credit, lower and stable interest rates, accelerated depreciation allowances, and labor/management relations which permit automation. Those noting an improved production climate in foreign countries mentioned a higher availability of skilled personnel and a ready source of low-cost parts and subassemblies in some countries.

Table 17.--Capital expenditures for facilities used primarily in the production of telecommunications equipment in the United States and in foreign countries reported by U.S. producers, annual 1981-83 and average anticipated, 1984-88 and 1989-93 1/

(In thousands of dollars)

Item	1981	1982	1983	1984-88	1989-93
Facilities in the United States:					
Land, and land improvements	***	***	***	14,673	2/
Buildings and leasehold improvements	***	***	***	195,395	2/
Machinery, equipment, and fixtures:					
New 3/	***	***	***	1,372,379	2/
Used	***	***	***	***	2/
Other	***	***	***	***	2/
Facilities in other countries:					
Land, and land improvements	***	***	***	***	2/
Buildings and leasehold improvements	***	***	***	***	2/
Machinery, equipment, and fixtures:					
New 3/	***	***	***	***	2/
Used	***	***	***	***	2/
Other	***	***	***	***	2/

1/ Data were not supplied in all categories by all respondents due to their inability to provide the information requested.

2/ Not meaningful due to insufficient reporting.

3/ Includes only new machinery not previously employed.

Source: Compiled from responses to questionnaires of the U.S. International Trade Commission.

Research and development expenditures

Expenditures in research and development of telecommunication equipment in the United States, as reported by repondents (U.S. producers) to the Commission's questionnaire, rose from * * * percent of the value of their total shipments in 1981 to * * * percent in 1983, or from * * * million in 1981 to * * * million in 1983 (table 18). Expenditures increased in every product category monitored. As shown in the following tabulation total expenditures in the United States increased by 52 percent from 1981 to 1983:

Table 18.--Telecommunications equipment: U.S. producers' research and development expenditures in the United States and in foreign countries, by products, 1981-83, and anticipated averages 1984-88 and 1989-93 1/

(In thousands of dollars)

Product	1981	1982	1983	1984-88 1/	1989-93 1/
	In the United States				
Transmission equipment (total)	42,327	53,636	62,120	79,102	***
Switching equipment (total)	***	***	***	***	***
Class 5 central office switches	***	***	***	***	***
Customer premises equipment (CPE) (total) 2/	232,139	317,377	372,124	277,302	***
Telephone sets	10,664	25,136	29,953	54,800	***
Private branch exchanges	77,917	108,452	138,870	111,799	***
Key system switch-equipment	***	***	***	***	***
Data display terminals	***	***	***	***	***
Cable, wire, and lightguide (total)	***	***	***	***	***
Total, all products	***	***	***	***	***
	In foreign countries				
Transmission equipment (total)	***	***	***	***	***
Switching equipment (total)	***	***	***	***	***

See footnotes at end of table.

Table 18.--Telecommunications equipment: U.S. producers' research and development expenditures in the United States and in foreign countries, by products, 1981-83, and anticipated averages, 1984-88 and 1989-93 1/--Continued

(In thousands of dollars)

Product	1981	1982	1983	1984-88 1/	1989-93 1/
	In foreign countries				
Transmission equipment (total)	***	***	***	***	***
Switching equipment (total)	***	***	***	***	***
Class 5 central office switches	***	***	***	***	***
Customer premises equipment (CPE) (total) 2/	***	***	***	***	***
Telephone sets	***	***	***	***	***
Private branch exchanges	***	***	***	***	***
Key system switching equipment	***	***	***	***	***
Data display terminals	***	***	***	***	***
Cable, wire, and lightguide (total)	***	***	***	***	***
Total, all products	***	***	***	***	***

1/ Data were not supplied in all categories by all respondents due to the inability to provide the information requested.

2/ Note that the data for the 4 types of CPE identified may not add to the CPE total (data were not collected on "all other" CPE).

Source: Compiled from responses to questionnaires of the U.S. International Trade Commission.

Product	Percentage increase during 1981-83
Transmission equipment (total)	47
Switching equipment (total)	***
Class 5 central office switches	***
Customer premises equipment (total)	60
Telephone sets	181
Private branch exchanges	78
Key system switching equipment	***
Data display terminals	***
Cable, wire, and lightguide (total)	***
Total, all products	52

The largest percentage increases occurred in expenditures on development of telephone sets and key system switching equipment, but the actual dollar amounts are small when compared with total expenditures. The large percentage increase in PBX's reflects the growing competition in the marketplace; conversely, * * *. Data reported for 1984-88 and 1989-93 are not conclusive owing to the inability of respondents to estimate future expenditures, however, average annual expenditures appear to be increasing generally by large amounts.

Research and development expenditures in foreign countries by U.S. producers were low compared with expenditures in the United States, increasing from * * * percent of the value of U.S. expenditures (* * *) in 1981 to * * * percent (* * *) in 1983. However, large increases in foreign expenditures occurred in nearly every product category except PBX's and cable, wire, and lightguide (the increase in key system switching equipment was small in absolute terms). The data reported on future investment are unreliable.

U.S. producers were requested to comment on expected changes in future R. & D. investment. Most respondents to the Commission's questionnaire indicated that the environment for investment in R. & D. in the United States and in foreign countries had no effect on their expenditures, as shown in the following:

Item	Yes	No
Are expected changes in the United States predicated on an improved environment for R. & D. in the United States?	7	24
Are expected changes in foreign countries predicated on an improved environment for production in foreign countries?	2	24

In their responses, several respondents assumed continued tax credits and indicated a desire for a highly qualified group of college graduates to employ in R. & D. efforts. A few respondents mentioned the possibility of certain U.S. markets being served by foreign suppliers as a reason for changing the direction of their R. & D. expenditures to foreign countries. Comments were also received on the desirability of foreign investment in R. & D. to satisfy demands of foreign customers and to have proximity to those markets where the adherence to local product standards may be a problem.

Royalties

According to industry sources, U.S. firms continue to lead the world in the technologies associated with telecommunications equipment. One measure of this technology leadership is royalty payments; as shown in the following

tabulation, royalty payments received by those U.S. firms responding to the Commission's questionnaire far exceeded those paid (in thousands of dollars): 1/

Item	1981	1982	1983
Royalty payments received----	15,573	11,586	14,958
Royalty payments paid--------	3,210	2,142	2,789

Royalty payments paid were about one-fifth of those received by reporting U.S. producers. A similar measurement of royalty payments was performed on a more narrow product category in a Commission study published in 1979. 2/ The data collected, shown in the following tabulation (in thousands of dollars), reflect a large technology gap in telephone terminal and switching equipment between U.S. and foreign manufacturers.

Year	Payments received by U.S. manufacturers from foreign companies	Payments made by U.S. manufacturers to foreign companies
1972----------	***	***
1976----------	***	***
1977----------	***	***

However, it should be emphasized that the data in the two preceding tabulations are not comparable and are useful only as an illustration of U.S. technology leadership in telecommunications equipment (the first tabulation) and telephone terminal and switching equipment (the second tabulation) at different time periods.

Financial information

The Commission requested profit-and-loss information for overall operations, network system and central office switching equipment operations, and CPE operations for 1981-83. Respondents were asked to provide information on net sales, cost of goods sold, gross profit, general, selling, and administrative expenses, and net operating profit. The results for overall operations are presented in table 19.

1/ It should be noted that A.T. & T. has been and continues to be under court order to freely offer its patents for license. * * *.

2/ A Baseline Study of the Telephone Terminal and Switching Equipment Industry, Report to the Subcommittee on Trade of the Committee on Ways and Means . . ., USITC Publication 946, February, 1979.

Table 19.--U.S. producers' profit-and-loss information on overall telecommunications equipment operations, 1981-83

Item	1981	1982	1983
Net sales---millions of dollars--	***	***	***
Cost of goods sold---------do----	***	***	***
Gross profit---------------do----	***	***	***
General, selling, and administrative expenses--------do----	***	***	***
Net operating profit-------do----	***	***	***
Number of firms reporting--------	31	31	32

Source: Compiled from data submitted in response to questionnaires of the United States International Trade Commission.

As indicated, net sales on overall operation increased slightly between 1981 and 1982, but declined in 1983. Net operating profit followed a similar trend. The ratio of net operating profit to net sales likewise rose from * * * percent in 1981 to * * * percent in 1982 and then fell to * * * percent in 1983. 1/ In 1981, 7 firms reported net operating losses, 4 firms reported losses in 1982, and 10 firms reported losses in 1983; 2 firms reported losses at the gross profit level in 1982 and 1983.

The results for network systems and central office and switching equipment operations are presented in table 20. Net sales for network system and central office switching equipment operations declined from 1981 to 1983 by * * * percent. Net operating profit increased between 1981 and 1982, but declined in 1983. The ratio of net operating profit to net sales was * * * percent in 1981, * * * percent in 1982, and * * * percent in 1983. 2/ Three firms reported net operating losses in 1981, and one firm reported a loss in 1982 and 1983. As a share of overall net sales, net sales of network system and central office switching equipment operations together accounted for * * * percent in 1981, * * * percent in 1982, and * * * percent in 1983. The corresponding figures for the ratio of net profits (network system to overall) were * * * and * * * percent.

Profit-and-loss information for CPE operations are presented in table 21. For CPE operations, net sales declined from 1981 to 1983 by * * * percent. Net operating profit increased between 1981 and 1982 and then declined in 1983. Net operating profit as a share of net sales was * * * percent in 1981, * * * percent in 1982, and * * * percent in 1983. Net operating losses were reported by five firms in 1981, six firms in 1982, and seven firms in 1983. One firm reported a loss at the gross profit level in 1983. Net sales for CPE operations as a share of overall net sales declined slightly, from * * * percent in 1981 to * * * percent in 1982, and * * * percent in 1983. The ratio of net profit (CPE to overall operations) fell from * * * percent in 1981 to * * * percent in 1982 and * * * percent in 1983.

1/ The ratios * * * .
2/ Ibid.

Table 20.--Profit-and-loss information on network system and central office switching equipment operations, 1981-83

Item	1981	1982	1983
Net sales---millions of dollars--	***	***	***
Cost of goods sold---------do----	***	***	***
Gross profit---------------do----	***	***	***
General, selling, and administrative expenses--------do----	***	***	***
Net operating profit-------do----	***	***	***
Number of firms reporting--------	10	10	10

Source: Compiled from data submitted in response to questionnaires of the United States International Trade Commission.

Table 21.--Profit-and-loss information on customer premises equipment operations, 1981-83

Item	1981	1982	1983
Net sales---millions of dollars--	***	***	***
Cost of goods sold---------do----	***	***	***
Gross profit---------------do----	***	***	***
General, selling, and administrative expenses--------do----	***	***	***
Net operating profit-------do----	***	***	***
Number of firms reporting--------	19	19	20

Source: Compiled from data submitted in response to questionnaires of the United States International Trade Commission.

The profit levels reported by respondents to the Commission's questionnaire are higher than similar figures obtained by comparing operating profit to sales as reported in the annual reports of several respondents. This figure was between 7 and 8 percent for 1981-83. This difference * * *.

Foreign Industries

Canada

Canada is serviced by 11 telephone companies, each providing a full range of telecommunications services. One company, by far the largest, excluding its U.S. subsidiary and affiliated telephone companies, controls about 60 percent of total Canadian telecommunications, and in addition, has controlling interest in three other major Canadian telephone companies. One of the other larger telephone companies is controlled by a U.S.-based firm. The preeminent Canadian telephone company not only controls other telephone companies, but also owns 55.4 percent of the largest telecommunications equipment manufacturer in Canada. 1/ This manufacturer, along with the second largest Canadian telecommunications manufacturer, provides about 60 percent of all such equipment sold in Canada.

Total employment in Canada's telecommunications services sector totals over 100,000 persons, with the largest provider of services accounting for 56 percent of total employment. 2/ Total revenue approached $9.0 billion in 1982, of which $4.6 billion was accounted for by the largest telephone company. This company spent approximately $341 million on R. & D. through a subsidiary which it jointly owns with the preeminent Canadian manufacturer and had capital expenditures in 1982 of $1.8 billion. This company had 12.3 billion dollars' worth of plant and equipment in 1982.

The largest Canadian telecommunications equipment manufacturer employed about 35,000 persons in 1983 and in 1982 had net sales of some $3.0 billion, of which $2.7 billion was accounted for by telecommunications equipment; assets in 1982 totaled almost $2.4 billion. The second largest Canadian manufacturer employed over 4,000 persons in 1982, had sales of over $200 million, spent some $59 million in R. & D., and had assets of over $350 million.

Japan

By far the most dominant force in the Japanese telecommunications industry is Nippon Telegraph & Telephone Public Corp. NTT is a Government-owned corporation which provides about 50 percent of the telecommunications service nationwide. NTT selected four firms to become part of the "NTT Family." 3/ These four firms, which together supply more than 50 percent of NTT's telecommunication needs, have traditionally received substantial funds for research and development from NTT as well as a market for their goods.

In total, there are about 344 manufacturers of telecommunications equipment in Japan, with the top 4 together producing 60 percent of total

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1/ Moody's International Manual, 1983, pp. 249-884.

2/ Statistics Canada, Canada Year Book: 1980-81, pp. 595-621.

3/ U.S. Department of Commerce, Country Market Survey Telecommunications Equipment, Japan, 1983, p. 2.

output (for domestic consumption and export). The top 20 firms together produce about 80 percent of total output. Although NTT is the largest buyer of telecommunications equipment in Japan, there are several other purchasers which provide private and/or specialized public services. These include local governments, Kokusai Denshin Denwa Co. Ltd. (the Government authorized long-distance carrier), the Japanese National Railways, and others.

In 1981, NTT employed 327,171 persons; employment of the four major manufacturers together totaled 288,969 persons. 1/ In 1982, the largest manufacturer had net sales worldwide of approximately $8.6 billion and an installed capital base valued at about $552 million; the firm operates 41 plants in Japan that manufacture products ranging from consumer electronics to telecommunications equipment. The second largest manufacturer had net sales worldwide of $5.0 billion in 1982 and an installed capital base worth $197 million. The third largest manufacturer had net sales of $3.2 billion in 1982; no figures are available for the firm's installed capital base. The fourth manufacturer had net sales worldwide of $856.7 million and an installed capital base valued at $70.6 million.

The total amount of money spent on R. & D. in Japan by private companies in the communications and electrical and electronic test equipment industries increased from $1.4 billion is 1978 to $3.4 billion in 1982. 2/ This amounted to an average annual growth rate of 26 percent for the 5-year period.

Netherlands

The Dutch PTT purchases about 90 percent of all its telecommunications equipment requirements in the Netherlands. The Dutch PTT employs approximately 28,000 persons, its revenue in 1982 amounted to more than $2 billion, and 1982 expenditures totaled almost $400 million. Of all the equipment purchased by the Netherlands in 1982, 50 percent was domestically produced. 3/ There are basically three domestic producers of telecommunications equipment in the Netherlands. The largest producer employed 350,000 persons worldwide and had worldwide sales of $5 billion in telecommunications equipment in 1982. The other two producers together employed about 2,000 persons and had domestic sales of about $300 million.

United Kingdom

In 1981, the British Telecommunications Act was implemented, abolishing the monopoly that the post office (PTT authority) had previously held over telecommunications services. In its place, British Telecom, a Government corporation, was formed to take charge of most of the telecommunications needs

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1/ The figures for these four manufacturers represent total employment in Japan in all ventures, not just telecommunications equipment. Moody's International Manual, 1983, pp. 1,356-1,584.

2/ Department of State airgram, May 15, 1984.

3/ U.S. Department of Commerce, Country Market Survey, Telecommunications Equipment, the Netherlands, June 1983, pp. 1-7.

of the United Kingdom. 1/ Concurrently, another company was established, which is to be a competitor of British Telecom. Compared with the size of British Telecom, however, the second company is small, having had a difficult time establishing itself (one of the reasons being problems with labor unions). 2/

Although the structure of the United Kingdom telecommunications authority is changing, British Telecom's major purchaser status is likely to remain unchanged. British Telecom currently controls about 93 percent of the total telecommunications market in the United Kingdom. 3/ British Telecom, which has at its disposal extensive R. & D. resources, has begun to enter into joint ventures with many of the United Kingdom's telecommunications equipment producers to jointly develop and manufacture certain kinds of equipment, particularly microelectronics and fiber optic transmission systems.

There are approximately 50 domestic companies manufacturing telecommunications equipment in the United Kingdom, with two companies dominating the market. Domestic producers traditionally provide about 85 percent of the equipment used in the United Kingdom. 4/

British Telecom employed nearly 250,000 persons in 1982 and had total revenues of almost $10 billion; 5/ the company spent about $2.6 billion on capital investment in 1982 and $250 million on R. & D. The largest manufacturer in the United Kingdom had worldwide net sales of almost $7 billion in 1982, with sales of telecommunications equipment accounting for about 20 percent; the firm exported slightly over 20 percent of total sales, total assets in 1982 amounted to about $5.7 billion, and the company employed approximately 144,000 persons. The second prominent company had worldwide sales of almost $1.5 billion in 1982, with sales of telecommunications equipment accounting for some 50 percent of the total; the firm's exports accounted for about 30 percent of total sales in 1982, had $1.1 billion in total assets in 1982, and employed about 43,000 persons.

Due in part to the restructuring of the telecommunications service sector in the United Kingdom, the authorities are also restructuring the certification procedures for telecommunications equipment which traditionally has been very complicated, time consuming, and expensive. 6/ Under the new standards, an independent commission will be set up to evaluate telecommunications equipment. The new procedures may even permit the testing of British standards by foreign laboratories.

1/ British Telecom is expected to become a private corporation by the fall of 1984.

2/ U.S. Department of Commerce, Global Market Survey, Telecommunications Equipment, United Kingdom, 1982, p. 9.

3/ "Deregulation of British Telecom Nearing Final Countdown," Communications Week, Jan. 30, 1984, pp. C 14 and C 16.

4/ U.S. Department of Commerce, Telecommunications Equipment, United Kingdom, 1982, p. 2.

5/ "BT the 51 Percent Solution," Financial Times, Sept. 27, 1983.

6/ Department of State airgram, May 17, 1984.

Sweden

The major purchaser of telecommunications equipment in Sweden is the Swedish Telecommunication Administration (STA), a Government monopoly. 1/ The STA works closely with the preeminent manufacturer of telecommunications equipment in Sweden. In 1982, the STA employed over 43,000 persons and had revenues of close to $2.0 billion. In the same year, STA invested almost $500 million in plants and equipment. The major thrust of the STA's R. & D. is the ongoing digitilization of switching and transmission systems and the introduction of innovative and sophisticated service designed to increase utilization of the networks. Although the STA's fundamental purchasing rule is to buy equipment from the lowest bidder, its joint R. & D. relationship with Sweden's major producer leads to a competitive advantage for that company. The STA, however, does buy certain equipment from foreign vendors, particularly high-technology products such as fiber optic transmission systems.

The largest Swedish producer of telecommunications equipment employed about 22,000 persons in 1982 and had worldwide sales exceeding $3.0 billion. 2/ Only about 6 percent of these sales were destined for domestic consumption, reflecting that company's strong export activity. In 1982, the firm invested about $400 million for use in R. & D. and subsidiary companies.

West Germany

The Deutsche Bundespost (PTT) is the principal supplier of telecommunications services in West Germany. As a purchaser of telecommunications equipment, it accounts for about 80 percent of all purchases. Domestic firms have traditionally supplied more than 80 percent of domestic demand for telecommunications equipment. 3/ There are about 100 companies in West Germany producing telecommunications equipment. 4/ There is one company, however, which dominates the market, with four or five other large companies specializing in certain products.

The Deutsche Bundespost employs over 500,000 persons, which includes postal employees as well as telecommunications service personal. Total revenue from telecommunications services in 1981 totaled about $8.0 billion. 5/ Telecommunications equipment expenditures by all purchasers in West Germany are expected to total about $5.4 billion in 1984. 6/

In 1982, the preeminent telecommunications equipment manufacturer in West Germany employed about 324,000 persons and had total worldwide sales of about $15 billion, of which about 30 percent was sales of telecommunications

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1/ U.S. Department of Commerce, Country Market Survey, Telecommunications Equipment, Sweden, 1982, p. 2.

2/ Moody's International Manual, p. 2,105.

3/ U.S. Department of Commerce, Global Market Survey, Communications Equipment and Systems, 1977, p. 36.

4/ Inteltrade, "The Position of the German Telecommunications Industry," Oct. 30, 1979, p. 2.

5/ Federal Republic of Germany, Statistical Yearbook, 1984.

6/ Telephony, Feb. 27, 1984, p. 42.

equipment. Exports account for about 50 percent total firm sales; in 1982, the company had total assets of about $13 billion. 1/

Italy

Italy's Ministry of Posts and Telecommunications (MPT) accounted for approximately 92 percent of all purchases of telecommunications equipment in 1982. 2/ About 87 percent of all equipment purchased in 1982 was manufactured in Italy. There are four major producers of telecommunications equipment in Italy. The largest producer accounted for 40 percent of the market, the second largest producer accounted for 24 percent, and the third and fourth ranking producers each provided about 12 percent of the market.

In 1982, MPT employment totaled 105,000 persons and capital expenditures for the year exceeded $3 billion. The largest producer employed approximately 27,000 persons in 1982 and had sales of $575 million, with total assets exceeding $1.2 billion. The second largest producer employed about 6,000 persons in 1982, had sales of $210 million, and total assets of almost $300 million. In 1982, the third largest producer employed about 5,000 persons, earned almost $200 million from sales, and had total assets of about $330 million. The fourth ranking producer employed approximately 5,500 persons in 1982; other information on this firm is not available.

France

The Ministere des Postes et Telecommunications (PTT) in France accounts for about 70 percent of all purchases of telecommunications equipment. 3/ Approximately 90 percent of all telecommunications equipment sold in 1982 was domestically produced. Five companies together accounted for about 95 percent of the domestic production of such equipment. 4/

The French PTT employed over 150,000 persons in 1982 and had revenues of more than $5 billion. 5/ The largest producer had net sales of telecommunications equipment of about $1.6 billion in 1982 and employed over 39,000 persons in the manufacture of telecommunications equipment. In 1982, the second largest producer had net sales of $1.3 billion of telecommunications equipment and employment of about 30,000, whereas the third largest producer had sales of about $500 million and employed about 9,000. 6/ The fourth largest producer recorded sales of telecommunications equipment of almost

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1/ Moody's International Manual, 1983, pp. 1,123-1,124.

2/ U.S. Department of Commerce, Country Market Survey, Telecommunications, Italy, 1983, p. 2.

3/ U.S. Department of Commerce, Country Market Survey, Telecommunications Equipment, France, 1977, p. 2.

4/ International Telecommunications Union, Telecommunications Journal, July 1979, pp. 409-413.

5/ Ibid.

6/ In a recent move, the largest producer took partial control of the second ranking producer--a move to provide more coordination between the two firms in order that they might be more competitive internationally.

$180 million in 1982 and employed some 4,000 persons; the fifth ranking producer employed 4,700 persons in the manufacture of approximately 175 million dollars' worth of telecommunications equipment. Expenditures on R. & D. in France by producers decreased from $424 million in 1981 to $310 million in 1983, or by an average of 14.5 percent annually. 1/

THE FUTURE U.S. TELECOMMUNICATIONS MARKET AND ITS IMPACT ON U.S. TELECOMMUNICATIONS TRADE

Three Scenarios of the Future of the Telecommunications Industry

Introduction

The first scenario, the Baseline Scenario, is a statistical projection of import and export trends based solely on historical data. This scenario assumes no future disruptions in the market that were not already manifest in past data, and no adjustments have been made to reflect changing events after December 31, 1983. Throughout the historical period covered by this study, 1967-83, GNP has tended to track closely with consumption of telecommunications equipment. For this reason, the Baseline Scenario was constructed from a regression analysis of the relationship between GNP and apparent U.S. consumption, imports, and exports of telecommunications equipment.

The views of the participants in the market are described in the second scenario, the Respondent Scenario. Information gathered from U.S. producers, importers, and purchasers was used as a model for the industry. This scenario assumes that the companies that submitted their estimates of their future consumption, imports, and exports are representative of the industry and that they have implicity evaluated likely future events, the effects of divestiture, and market responses as well as any other factors which may affect the industry. The respondents' estimates were applied to data for the base year 1983, and no adjustments were made to these responses to reflect other views of events in the U.S. market.

The third scenario, the Open Market Scenario, is a forecast of apparent U.S. consumption, imports, and exports based on a variety of factors present or expected to be present in the telecommunications equipment marketplace. Some of the factors taken into consideration in this scenario are historical data (1967-83), pricing policies, market saturation, technological changes, and barriers to trade, as well as events concerning the production and sales of individual companies. This scenario represents the direction of the U.S. telecommunications equipment industry based on the current situation and expected market forces as perceived by the Commission.

Overview

As might be expected, the Baseline, Respondent, and Open Market Scenarios each present differing views of the future of the telecommunications equipment industry in the United States. The major difference among the three is the projected growth in the market, as shown in table 22. In the short term,

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1/ Department of State airgram, May 22, 1984.

consumption should increase at an average annual rate of 5.9 percent in the Baseline Scenario, 0.8 percent in the Respondent Scenario, and 8.2 percent in the Open Market Scenario. The gap in the growth rates should widen in the long term to 4.3, 0.3, and 8.6 percent, respectively.

Table 22.--Comparison of the projected annual growth rates in the Baseline, Respondent, and Open Market Scenarios

(In percent)

Item	1983-88			1989-93		
	Baseline	Respondent	Open Market	Baseline	Respondent	Open Market
U.S. producers' shipments	+5.3	1/	+7.8	+4.0	1/	+8.1
Exports	+5.1	1/	+6.6	+5.0	1/	+6.0
Imports	+9.8	1/	+10.1	+6.3	1/	+11.0
Apparent consumption	+5.9	+0.8	+8.2	+4.3	+0.3	+8.6

1/ Not meaningful.

Source: Based on data in tables L-1-L-15 of this report.

As shown in table 23, the resulting estimates of the market in 1988 for the three Scenarios should range from $19,244 million to $27,357 million and in 1993 from $19,513 million to $41,310 million; the projections for domestic shipments parallel those of consumption. The reason for the different short-and long-term growth rates in consumption and shipments between the Baseline and the Open Market Scenarios is largely a reflection of deregulation. The Baseline Scenario's growth is based on the historical trend in a mostly regulated period, thus, it does not take into account the effects of deregulation as does the Open Market Scenario.

Table 23.--Comparison of projections of the Baseline, Respondent, and Open Market Scenarios

Item	1988			1993		
	Baseline	Respondent	Open Market	Baseline	Respondent	Open Market
U.S. producers' shipments million 1983 dollars	23,129	1/	25,976	28,187	1/	38,349
Exports-----do----	1,722	1/	1,845	2,202	1/	2,467
Imports-----do----	3,172	1/	3,226	4,297	1/	5,428
Apparent consumption------do----	24,579	19,244	27,357	30,282	19,513	41,310
Ratio of imports to consumption percent	12.9	1/	11.8	14.2	1/	13.1
Ratio of exports to shipments percent	7.4	1/	7.1	7.8	1/	6.4

1/ Not meaningful.
Source: Based on data in tables L-1-L-15 of this report.

The growth in imports in the short term is approximately the same in the Baseline and Open Market Scenarios; imports should grow at about 10 percent annually to $3,172 million and $3,226 million, respectively. However, in the long term, the Baseline Scenario shows a decline in the annual growth rate of imports to 6.3 percent, whereas while the Open Market Scenario shows an increase to 11 percent--this results in projected import values ranging from $4,297 million to $5,428 million by 1993.

In both the Baseline and Open Market Scenarios, exports are expected to grow at similar rates in the short and long terms; in the Baseline Scenario the rate is approximately 5 percent per year and in the Open Market Scenario it is over 6 percent. In the short term, the estimates of exports are expected to range from $1,722 million to $1,845 million, and in the long term from $2,202 million to $2,467 million for the Baseline and Open Market Scenarios, respectively.

The ratios of imports to consumption and exports to shipments are generally higher in the Baseline Scenario than in the Open Market Secnario. This is because the values of consumption and shipments are projected to increase at a much slower rate in the Baseline Scenario than in the Open Market Scenario, but the growth rates of imports and exports for the two scenarios are similar.

The Baseline Scenario

If the future of the telecommunications equipment market were determined solely on the basis of its past performance, as it is in this scenario, growth

in shipments and consumption would be at low levels. Consumption is expected to increase by less than 6 percent per year to $24,579 million in the short term and by less than 4.5 percent annually in the long term to $30,282 million (tables 24 and 25). The trend of decreasing growth rates is projected to be present in shipments, imports, and exports as well.

Table 24.--Telecommunications equipment: Baseline Scenario projections of U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, by product groups, 1983, and projected 1988 and 1993

Item	1983	1988	1993
	All telecommunications equipment		
U.S. producers' shipments million 1983 dollars	17,834	23,129	28,187
Exports---------do----	1,342	1,722	2,202
Imports---------do----	1,990	3,172	4,297
Apparent consumption---------do----	18,483	24,579	30,282
Ratio of imports to consumption percent	10.8	12.9	14.2
Ratio of exports to shipments--do----	7.5	7.4	7.8
	Transmission equipment		
U.S. producers' shipments million 1983 dollars	4,970	6,867	8,671
Exports---------do----	148	188	239
Imports---------do----	332	440	544
Apparent consumption---------do----	5,154	7,119	8,976
Ratio of imports to consumption percent	6.4	6.2	6.1
Ratio of exports to shipments--do----	3.0	2.7	2.8
	Switching equipment		
U.S. producers' shipments million 1983 dollars	3,593	4,319	5,031
Exports---------do----	534	708	928
Imports---------do----	28	55	81
Apparent consumption---------do----	3,086	3,666	4,184
Ratio of imports to consumption percent	0.9	1.6	2.0
Ratio of exports to shipments--do----	14.9	16.4	18.5

Table 24.--Telecommunications equipment: Baseline Scenario projections of U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, by product groups, 1983, and projected 1988 and 1993--Continued

Item	1983	1988	1993
	Customer premises equipment		
U.S. producers' shipments, million 1983 dollars	7,392	9,469	11,442
Exports, do	495	618	774
Imports, do	1,582	2,593	3,556
Apparent consumption, do	8,479	11,444	14,224
Ratio of imports to consumption, percent	18.7	22.7	25.0
Ratio of exports to shipments, do	6.7	6.5	6.8
	Cable, wire, and lightguide		
U.S. producers' shipments, million 1983 dollars	1,879	2,474	3,043
Exports, do	165	208	261
Imports, do	49	84	116
Apparent consumption, do	1,763	2,350	2,898
Ratio of imports to consumption, percent	2.8	3.6	4.0
Ratio of exports to shipments, percent	8.7	8.4	8.6

Source: Based on data in tables L-1-L-9 of this report.

Import penetration should rise in both the short and long terms, because growth in imports should be much higher than that of consumption. Imports are expected to grow by nearly 10 percent in the short term to $3,172 million and by almost 6.5 percent in the long term to $4,297 million. The major sources of imports in the historical period (1967-83)--Japan, Taiwan, Hong Kong, and Canada--are expected to continue to be the largest foreign suppliers to the U.S. market through 1993. The ratio of exports to shipments should fall in the short term, when shipments are expected to increase faster than exports, and rise in the long term, when the growth in shipments is expected to slow more than the growth of exports. In the short term, exports should increase by just over 5 percent per year to $1,722 million, and shipments should grow by nearly 5.5 percent annually to $23,129 million. However, in the long term, exports are expected to maintain approximately the same rate of growth and rise to a value of $2,202 million, but shipments should increase by only 4 percent annually to $28,187 million. U.S. manufacturers are expected to maintain their presence in their current export markets, namely, Korea, Canada, the United Kingdom, and Saudi Arabia.

Table 25.--Telecommunications equipment: Baseline Scenario projections of annual rate of increase in U.S. producers' shipments, exports, imports, and apparent consumption, by product groups, 1983-1988 and 1989-93

(In percent)

Period	U.S. producers' shipments	Exports	Imports	Apparent consumption
	All telecommunications equipment			
1983-88	5.3	5.1	9.8	5.9
1989-93	4.0	5.0	6.3	4.3
	Transmission equipment			
1983-88	6.7	4.9	5.8	6.7
1989-93	4.8	4.9	4.3	4.7
	Switching equipment			
1983-88	3.8	5.8	14.8	3.5
1989-93	3.1	5.6	8.0	2.7
	Customer premises equipment			
1983-88	5.1	4.5	10.4	6.2
1989-93	3.9	4.6	6.5	4.4
	Cable, wire, and lightguide			
1983-88	5.7	4.8	11.6	5.9
1989-93	4.2	4.6	6.7	4.3

Source: Based on data in tables L-1-L-9 of this report.

The market for transmission equipment should show trends similar to those for the industry as a whole. The growth in consumption and shipments should be relatively low and slow in the long term, from slightly over 6.5 percent in the short term to just over 4.5 percent in the long term. Consumption is expected to rise from $5,154 million in 1983 to $7,119 million in 1988 and then to $8,976 million in 1993, and shipments should rise from $4,970 million to $6,867 million and then to $8,671 million over the same period. Compared with the rest of the industry, the increase in imports should be less than that of consumption throughout the period. As a result, import penetration is expected to decline from 6.4 percent in 1983 to 6.2 percent in the short term and to 6.1 percent in the long term. However, the majority of imports should continue to come from Japan, Canada, Taiwan, and Hong Kong. The growth rate of exports should hold steady at nearly 5 percent annually through 1993. Exports are expected to increase from $148 million in 1983 to $239 million in 1993. In the short term, the growth rate of exports is expected to be lower than that of shipments, so the ratio of exports to shipments should decline; in the long term, the growth rate of exports should be higher, thus, the

export/shipment ratio should increase. The major markets for U.S. goods are expected to be the United Kingdom, Canada, Mexico, and West Germany.

The switching equipment market is projected to show the lowest growth of all the sectors of the telecommunications market, and this growth is expected to decline from 3.5 percent per year in the short term to just over 2.5 percent annually in the long term. This represents an increase in demand from $3,086 million in 1983 to $3,666 million in 1988 and to $4,184 million in 1993. Imports are expected to grow at high rates through 1993--14.8 percent annually in the short term and 8 percent per year in the long term. However, since their value relative to consumption should remain small, totaling only $81 million in 1993, import penetration increases only from 0.9 percent in 1983 to 2 percent in 1993. The sources of these imports are expected to be Japan and Canada. In the short and long terms, exports are expected to grow considerably faster than shipments and to show very little decline in the rate of increase. Exports are expected to grow by nearly 6 percent per year in the short term and by just over 5.5 percent in the long term. As a result, the value of exports increases from $534 million in 1983 to $708 million in 1988 and to $928 million by 1993. Shipments should grow by nearly 4 percent per year in the short term to $4,319 million and by just over 3 percent annually in the long term to $5,031 million. Because of this, the ratio of exports to shipments should increase through the forecast period. Korea, Saudi Arabia, Canada, and Egypt are expected to remain the largest foreign markets for U.S. switching equipment.

Both consumption and shipments of CPE are projected to show low growth in the short term which should decline in the long term. Consumption should increase by 6.2 percent annually in the short term to $11,444 million, and CPE shipments are expected to grow by 5.1 percent per year to $9,469 million over the same period. In the long term, CPE consumption is expected to grow by nearly 4.5 percent annually to $14,224 million, and shipments should increase at just under 4 percent per year to $11,442 million. The growth in imports should decline in the long term as well, but is expected to remain well above that of consumption through 1993. Imports of CPE should rise by 10.4 percent annually in the short term to $2,593 million and by 6.5 percent annually in the long term to $3,556 million. Consequently, the level of import penetration should increase in both the short and long terms. The major portion of CPE imports is expected to be supplied by Japan, Taiwan, Hong Kong, and Korea. Exports are projected to grow more slowly than shipments in the short term, by only 4.5 percent per year, to a value of $618 million, thus producing a lower ratio of exports to shipments. In the long term, the combination of slower growth in CPE shipments and a slight increase in the growth of exports is expected to result in a higher ratio of exports to shipments. Exports are expected to increase by just over 4.5 percent per year to $774 million in 1993. The main foreign markets for U.S. CPE are expected to be Canada, the United Kingdom, Korea, and West Germany.

The increase in consumption and shipments of cable, wire, and lightguide should be under 6 percent in the short term and just over 4 percent in the long term. Consumption is expected to increase from $1,763 million in 1983 to to $2,350 million in 1988 and to $2,898 million in 1993 while shipments grow from $1,879 million to $2,474 million and to $3,043 million. The growth in imports is much higher than that of consumption during both periods, and as a

result, import penetration should almost double by 1993. Imports should rise by 11.6 percent per year to $84 million in 1988 and just under 7 percent annually to $116 million in 1993. The major sources of these imports should be Mexico, Taiwan, Japan, and Canada. Exports should increase more slowly than imports in the short term, producing a decline in the ratio of exports to shipments. However, because the growth of shipments is expected to drop below that of exports in the long term, the ratio of exports to shipments should increase during this period. Exports are expected to grow by just under 5 percent per year to $208 million in 1988 and by just over 4.5 percent to $261 million in 1993. The main export markets for cable, wire, and lightguide should continue to be Egypt, Canada, the United Kingdom, and Mexico.

The Respondent Scenario

The data received from the respondents to the Commission's questionnaire were not sufficient to construct the scenario as designed. However, using an alternative approach, consumption data were compiled from U.S. purchasers' response to the Commission's questionnaire. 1/ The trends, according to fragmented data, differ markedly from those of the Baseline and Open Market Scenarios. The data indicated that the total market for telecommunications equipment should grow by a rate of less then 1 percent through 1993, from $18,482 million in 1983 to $19,534 million in 1993, as shown in the following tabulation:

1/ The data used in this Respondent Scenario were compiled from the responses of U.S. purchasers to the Commission's questionnaires. Respondent firms were of various sizes dealing in various telecommunications products. Some of the small- and medium-sized firms responded for the periods 1984-88 and 1989-93 in a few of the product categories, whereas others did not. For the most part, large-sized firms did not respond in many of the product categories. Most provided no response for a long-term forecast. The resulting data base yielded trends that were unacceptable by the Commission as representative of the industry.

The data on future shipments by U.S. producers were also tested to provide a meaningful data base to approach the scenario from a different aspect. However, the data received from U.S. producers on short- and long-term shipments were also unrepresentative of the industry. The respondents to the Commission's questionnaires, when questioned on the nature of their responses, generally professed an inability to forecast their future operations given the rapidly changing conditions in the telecommunications market. The accuracy of the data is questionable also owing to the failure of the U.S. purchasers, as a group, to forecast their future purchases with a consistency necessary to yield a reliable data base. The scenario is a rough measurement of consumption only; it does not measure domestic shipments or trade.

Apparent consumption	1983	1988	1993	Annual rate of change 1983-88	Annual rate of change 1989-93
	--Million 1983 dollars--			-----Percent----	
Total, all equipment	18,482	19,244	19,534	0.8	0.3
Transmission equipment	5,154	6,884	6,890	6.0	1/
Switching equipment	3,086	4,810	3,922	9.3	-4.0
Customer premises equipment	8,479	6,108	7,406	-6.4	3.9
Cable, wire, and lightguide	1,763	1,442	1,316	-3.9	-1.8

1/ Less than 0.1 percent.

Given the changes in technology that are constantly adding new products and services to the telecommunications industry, it is unlikely that the market will experience such a low rate of increase.

On the basis of the available data, the market for transmission equipment is projected to increase by approximately 6 percent annually in the short term, from $5,154 million in 1983 to $6,884 million in 1988, and show no increase in the long term. The short- and long-term trends reflect a pessimistic prediction of market growth; however, because of the growing use of satellites for voice and data communications, the proliferation of microwave and cellular use, and the conversion to fiber optic technology, this is probably not an accurate indication of the future.

The switching equipment market is expected to grow in the short term by over 9 percent per year, from $3,087 million in 1983 to $4,810 million in 1988, and decline in the long term by an average annual rate of 4 percent to $3,922 million. However, this short-term increase appears to be excessive compared with recent estimates made by many industry observers and in light of the fact that such growth in a replacement market would be unusual. The decline in the long term is equally unlikely, even the most pessimistic long-term forecasts reflect an increase because of the expected replacement of first generation digital switching equipment.

According to the Respondent Scenario, the market for CPE should decrease by nearly 6.5 percent annually in the short term, from $8,479 million in 1983 to $6,108 million in 1988, and grow by an average annual rate of 4 percent in the long term to $7,406 million. However, with substantial growth in private networks and automated offices predicted throughout the short and long terms, it is unlikely that the market would decline in the short term and increase so slowly in the long term.

Respondent data indicate that the market for cable, wire, and lightguide is expected to decline by nearly 4 percent annually, from $1,763 million in 1983 to $1,442 million in 1988, and by 2 percent annually in the long term to $1,316 million. Although this trend closely fits projections for the copper cable market, it is the opposite of the estimated trends for fiber optic cable.

The Open Market Scenario

The U.S. market for telecommunications equipment is expected to show much stronger growth over the next 10 years than it has in the past decade. The

demand for telecommunications equipment grew by approximately 2.5 percent annually, in real terms, during 1973-83. 1/ However, as a result of several factors at work in the marketplace, demand should grow by an average annual rate of more than 8 percent through 1993, from $18,482 million in 1983 to $27,357 million in 1988 and to $41,310 million in 1993 (tables 26 and 27). 2/ One of the fundamental changes in the market that is fueling demand is the increased rate of technological evolution. Long product life cycles of the past are now, in many cases, being shortened all the way up to the point of obsolescence upon installation. 3/ Customer demands for expanded services provided by the latest technology are expected to force more rapid replacement schedules for both private and public networks. 4/

Table 26.--Telecommunications equipment: Annual rate of increase of U.S. producers' shipments, exports, imports, and apparent consumption, by product groups, projected for the Open Market Scenario, 1983-1988 and 1989-1993

(In percent)

Period	U.S. producers' shipments	Exports	Imports	Apparent consumption
	All telecommunications equipment			
1983-88	7.8	6.6	10.1	8.2
1989-93	8.1	6.0	11.0	8.6
	Transmission equipment			
1983-88	8.0	7.7	9.6	8.2
1989-93	8.6	7.6	12.2	8.9
	Switching equipment			
1983-88	6.8	7.2	15.2	6.9
1989-93	7.2	5.6	17.2	7.6
	Customer premises equipment			
1983-88	7.4	4.6	10.1	8.8
1989-93	7.6	5.9	10.5	9.0
	Cable, wire, and lightguide			
1983-88	7.3	9.1	11.3	7.2
1989-93	6.7	5.4	11.0	7.0

Source: Based on data in tables L-11 - L-15 of this report.

1/ See app. L for historical and projected data.
2/ Business Week, Oct. 24, 1984, p. 128.
3/ Ibid., p. 126.
4/ Telephone interview with financial analyst for investment firm, Mar. 15, 1984.

Table 27.--Telecommunications equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, by product groups, for the Open Market Scenario, 1983, and projected 1988 and 1993

Item	1983	1988	1993
	All telecommunications equipment		
U.S. producers' shipments million 1983 dollars	17,834	25,976	38,349
Exports----------do----	1,342	1,845	2,467
Imports----------do----	1,990	3,226	5,428
Apparent consumption do----	18,482	27,357	41,310
Ratio of imports to consumption---percent--	10.8	11.8	13.1
Ratio of exports of shipments-----percent--	7.5	7.1	6.4
	Transmission equipment		
U.S. producers' shipments million 1983 dollars	4,970	7,318	11,057
Exports----------do----	148	215	310
Imports----------do----	332	525	934
Apparent consumption do----	5,154	7,628	11,681
Ratio imports to consumption---percent--	6.4	6.9	8.0
Ratio of exports to shipments--------do----	3.0	2.9	2.8
	Switching equipment		
U.S. producers' shipments million 1983 dollars	3,593	4,999	7,061
Exports----------do----	534	755	986
Imports----------do----	28	56	124
Apparent consumption do----	3,086	4,300	6,200
Ratio of imports to consumption---percent--	0.9	1.3	2.0
Ratio of exports to shipments-----percent--	14.9	15.1	13.9

Table 27.--Telecommunications equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, by product groups, projected for the Open Market Scenario, 1983, and projected 1988 and 1993--Continued

Item	1983	1988	1993
	Customer premises equipment		
U.S. producers'shipments			
million 1983 dollars--	7,392	10,987	16,524
Exports----------do----	495	620	825
Imports----------do----	1,582	2,562	4,230
Apparent consumption do----	8,479	12,929	19,929
Ratio of imports to consumption---percent--	18.7	19.8	21.2
Ratio of exports to shipments-----percent--	6.7	5.6	5.0
	Cable, wire, and lightguide		
U.S. producers' shipments			
million 1983 dollars--	1,879	2,672	3,692
Exports----------do----	165	255	332
Imports----------do----	49	83	140
Apparent consumption do----	1,763	2,500	3,500
Ratio of imports to consumption---percent--	2.8	3.3	4.0
Ratio of exports to shipments-----percent--	8.8	9.5	9.0

Source: Based on data in tables L-11-L-15 of this report.

Advancing technology is also broadening the realm of telecommunications. The digital computer for example, has opened up new applications for telecommunications equipment that present substantial growth opportunities. In addition to transmitting voice and telex messages, telecommunications systems will be used increasingly to transmit computer data and facsimiles and to hold video conferences. 1/ The belief by the business community that enhanced telecommunication capabilities result in more successful operating results should influence the demand for both private and public networks. 2/ Common carriers are expected to increase their consumption of telecommunications equipment in order to meet the demands of business customers, and companies choosing to bypass the common carriers should increase consumption by the end user.

1/ Business Week, Oct. 24, 1984, p. 126.
2/ Communications News, January 1984, pp. 30 and 31.

The telecommunications equipment trade balance, which was negative for the first time in 1983, is expected to remain negative, and the gap between imports and exports should widen throughout the projected period. 1/ Exports of telecommunications equipment should total $1,845 million in 1988 and $2,467 million in 1993, up from $1,342 million in 1983, and imports should rise from $1,990 million in 1983 to $3,226 million in 1988 and $5,428 million in 1993. A variety of factors are responsible for this trend. The most important factor in the domestic market is that the United States is a high-cost producer and is expected to face intense competition from most foreign producers on the basis of price. 2/ This should allow low-cost foreign producers, primarily in the Far East, to continue to gain market share in the United States. The areas in which the greatest loss of market share to imports are projected are those products that are price sensitive. These products, namely, the various products comprising CPE, have already experienced rapidly climbing ratios of import to consumption. 3/

One factor that should moderate the growth of imports is the growing number of foreign producers that choose to manufacture in the United States all or part of their products which are not price sensitive. 4/ Industry sources allege that the slow growth in exports is a product of foreign barriers to trade and the inexperience of U.S. telecommunications companies in international markets. 5/ They point out that foreign countries are not expected to significantly open their markets in the near term and, perhaps, not even in the long term. Industry representatives agree that even if these markets were deregulated--legally open to all manufacturers--the tendency for the government-owned and government-operated telephone companies to buy only domestically produced goods would probably not change significantly. From the foreign government's point of view, buying domestic goods should continue to be a sound political and economic policy. 6/

To increase exports, barriers requiring local content or restricting imports would have to be overcome. The means by which U.S. firms are expected to get around these barriers is by increasing offshore production and forming joint ventures with foreign firms. 7/ The former should negatively affect U.S. exports and shipments, and the latter should lead to an entree into foreign markets. Joint ventures and cooperative marketing agreements are a logical step for U.S. firms, because most American telecommunications equipment companies have never had to sell beyond their borders to maintain sales volume. Thus, they lack the experience, organization, and expertise necessary to sell in foreign countries that could be gained through connections with foreign firms. 8/

However, the U.S. industry's position in foreign markets will continue to be affected by the fact that equipment must be adapted to foreign needs and

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1/ Transcript of the hearing, p. 19, Apr. 24, 1984.
2/ Transcript of the hearing, p. 24, Apr 24, 1984.
3/ See app. L for historical and projected data.
4/ Transcript of the hearing , p. 24, and 85, Apr 24, 1984.
5/ Business Week, Oct. 24, 1984, p. 138.
6/ Ibid., pp. 128-30.
7/ Transcript of the hearing, p. 81, Apr. 24, 1984.
8/ Forbes, Dec. 19, 1983, p. 52.

specifications and the absence of U.S. products in most foreign markets. Developing equipment for foreign markets, especially digital equipment, is a long and expensive process and one that is likely to retard U.S. exports for some time. In countries that do not produce their own telecommunications equipment, there is a strong tendency to buy only from established suppliers. Since many U.S. firms lack foreign-market presence, they would have to displace a supplier that is already established. 1/ Assuming U.S. firms can do this, it would be a long process, yielding no major gains in the period covered by this scenario.

Looking at the projections for the short and long terms, shipments are expected to grow at a slower rate than consumption. In the short term they are expected to grow nearly by 8 percent per year, from $17,834 million to $25,976 million, and in the long term, shipments should increase by an average annual rate of just over 8 percent to $38,349 million. Import penetration, which jumped dramatically from 4.4 percent in 1981 to 10.8 percent in 1983, should continue its upward trend through 1993. The ratio of imports to consumption is expected to increase more rapidly than in most of the historical period, 1967-83, 2/ but not as rapidly as during 1981-83, since the latter period is generally perceived by industry sources as a time of adjustment in the market as the effects of deregulation were being assessed and dealt with. The market is now expected to stabilize somewhat in the short term, resulting in a slowdown in the increases in import penetration.

The average annual rates of change show the expected effects of increased competition in world markets as export growth declines from 6.6 percent in the short term to 6 percent in the long term and the rapid growth in the U.S. market as consumption rises by more than 8 percent annually through 1993. The high growth in consumption throughout the period should make the U.S. market attractive to foreign manufacturers. Their success should be reflected in the increasing growth rate of imports. U.S. firms' ability to expand the level of exports is expected to decrease, mainly as a result of the increased competitiveness of foreign firms in foreign markets.

The divestiture of A.T. & T. severed the captive-supplier affiliation of Western Electric with the 22 Bell operating companies, effective January 1, 1984. This event opened the BOC market to all producers, domestic and foreign, and most industry analysts agree that Western Electric's share of the BOC market will decline as a result. However, this is not a new trend since Western Electric's portion of the Bell operating companies' market has been declining for several years. 3/ For example, in 1983, one Bell operating company's outside purchases represented 50 percent of its total procurement. 4/ However, many experts in the industry feel that because some equipment is made only by Western Electric and because add-on and replacement equipment must be compatible, the bulk of the Bell operating companies' market should remain with Western Electric.

1/ Ibid.
2/ See app. L for historical data.
3/ Electronic News, Jan. 23, 1984, p. 22.
4/ Communications Week, Jan. 30, 1984, p. 5.

There is no particular indication that the divestiture is expected to produce an increase in telecommunications equipment imports. In all the sectors of telecommunication equipment there are ample numbers of domestic producers which are evaluated along with foreign producers on the basis of price; product value and competitiveness; the cost of hardware installation, maintenance, and repairs; and the reliability of service. 1/ The majority of foreign-manufactured goods purchased by BOC's to date and those expected to be purchased in the next 5 to 10 years should be in the CPE sector, and, for the most part, this equipment should be for resale. 2/ BOC suppliers of large-scale, high-technology equipment are mainly domestic producers. This is generally not expected to change much, because it would require changes in auxiliary equipment as well, and servicing of foreign-made equipment may not be as responsive as that of domestically manufactured equipment.

Transmission equipment.--The demand for transmission equipment in the United States should grow steadily through 1993, from $5,154 million in 1983 at an average annual growth rate of just over 8 percent, to $7,628 million in the short term, and by nearly 9 percent in the long term, to $11,681 million by 1993. This increase in demand is expected to occur in both public and private networks as a result of the expanding range of available services and the increased demand for all services. In order to remain competitive in the marketplace and to meet the demand for services that is projected to grow by 13 percent per year, 3/ telephone companies are expected to replace, expand, and enhance their existing equipment at a more rapid pace. 4/

Long-distance carriers are also expected to increase their demand for transmission equipment. Competition is keen and will become even more so when all carriers are operating with equal access to local networks and under uniform access charges. Several long-distance carriers have already announced their plans to expand their networks with satellite, fiber optic, microwave, and computer systems in order to keep up with customer demand and to extend their markets into new geographical areas and new product lines. 5/ This expansion is expected to continue throughout the short and long terms.

The market for transmission equipment is expected to increase as a result of bypass, the use of private telecommunications networks that operate independently of the telephone companies. One of the major factors promoting bypass is expected to be the advent of access charges, which is expected to increase the cost of telephone services provided by the regulated telephone companies. Microwave systems can offer a lower cost alternative to common carrier services, and their use is expected to grow considerably in the next decade in both the private and public sectors. For example, other States and local governments are expected to follow the lead of South Carolina, which

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1/ Electronic News, Jun. 23, 1984, p. 1.
2/ Electronic Business, January 1984, p. 172.
3/ Communications News, January 1984, p. 31.
4/ Telephone interview with financial analyst for an investment firm, Mar. 15, 1984.
5/ The Washington Post, Washington Business, Feb. 6, 1984, pp. 1 and 13; The Wall Street Journal, Feb. 17, 1984, p. 16.

will purchase a microwave telecommunications system this year. 1/ Fiber optic systems such as the one used by a major bank 2/ are also expected to gain more widespread acceptance. There should also be a growing demand for satellite services to private networks, which, in turn, should increase the demand for ground stations. Sales of ground stations are expected to triple over the next 10 years 3/ with the concept of the "antenna-farm" becoming a reality in most major urban centers. 4/

Other new developments in the U.S. market that are just beginning to establish a foothold should contribute to the increased consumption of transmission equipment. The move on the part of real estate developers to provide commercial buildings with built-in telecommunications capabilities is a new idea that seems to be growing. This trend is expected to increase in urban areas, especially in rental properties. 5/ Cellular telecommunications systems 6/ are becoming established in the United States. By the 1990's, this market could reach 2 million subscribers. As a result, growth in cellular transmission equipment is expected to average more than 25 percent per year through 1993. 7/

Domestic consumption is expected to outpace U.S. producers' shipments in the short and long terms. By 1988, consumption should total $7,628 million, and shipments are expected to total $7,318 million; by 1993, consumption should rise to $11,681 million, and shipments, to $11,057 million. This is a result of the expected growth in imports from $332 million in 1983 to $525 million in 1988 and to $934 million in 1993. One of the product areas most vulnerable to import competition is expected to be fiber optics; since the Japanese expect to target one-half of half their fiber optic production for export and are devoting much research to the development of low cost equipment. Other countries in the Far East such as Taiwan, Korea, and Hong Kong are also expected to manufacture and export low-cost fiber optic equipment. Also, Canada and several Western European nations are gaining expertise in fiber optics and are expected to be potent forces in international markets. France, for example, has set its sights on gaining 15 percent of the world market by 1985. 8/ Another component of imports is expected to be cellular transmission equipment such as cell-site radio tranceivers from Japan, initially, and then increasingly from other countries in the Far East. 9/ The major source of transmission equipment in Europe is expected to continue to be Sweden.

1/ Communications Week, Jan. 30, 1984.
2/ Telecommunications, February 1984, pp. 86-94.
3/ Communications News, March 1983, p. 58.
4/ Ibid, Jan. 1984, p. 31.
5/ Electronic News, Feb. 6, 1984, p. 10.
6/ Cellular telecommunications systems connect a mobile terminal, such as a telephone in an automobile, to the public switched network. The mobile terminal can be moved through all the cells (effective transmission and reception areas) of a system without being disconnected from the public switched network.
7/ Telecommunications, March 1984, p. 45.
8/ Communications News, January 1984, p. 74.
9/ Telecommunications, March 1984, p. 48.

The ratio of imports to consumption is expected to continue its upward trend begun in 1981, when imports were only 2.6 percent of consumption and were valued at $122 million. Imports are expected to grow more rapidly than consumption, because the early gains by such suppliers as Japan, France, and Sweden have locked customers into specific equipment configurations, making the supplier relationship difficult to change. The ratio of exports to shipments is expected to decline only from 3.0 to 2.8 percent over the forecast period. This level is able to be maintained through exports of high-technology equipment, such as satellites and digital transmitters, to Japan 1/ and, on a limited scale, Western Europe.

Switching equipment.--The demand for switching equipment is expected to grow more slowly than the demand in the other equipment sectors. In the short term, the market should increase by slightly less than 7 percent to $4,300 million, and in the long term, by just over 7.5 percent to $6,200 million. The central office switching equipment market is mainly a replacement market and as such should grow slowly. 2/ However, a subset of this market, the one for digital switches, is expected to show dramatic growth--as high as 40 percent on a relatively small base by some estimates 3/--as a result of accelerated replacement schedules. 4/ This small segment's growth is expected to offset the flat or declining performance in the rest of the product line.

Over the next decade, it is unlikely that many purchasers of switching equipment would change suppliers, because the costs of changing all the associated equipment are prohibitive. Thus, manufacturers looking to increase their market share are expected to seek newer markets such as specialized common carriers, large private organizations, and the military. 5/ Because of the great cost in time and resources of developing central office switching equipment, manufacturers must also look beyond their borders to generate sufficient sales to recoup these expenses. During the projected period, manufacturers of switching equipment are expected to increase their efforts to sell in international markets in order to remain profitable. 6/

The ratio of imports to consumption is expected to remain relatively low, rising only to 1.3 percent in 1983 and 2.0 percent in 1993. This is because customers do not readily change suppliers, and through 1983 there was very little use of imported switching equipment. Another reason for the low level of imports is that domestically produced equipment is currently technologically more advanced than most foreign-made goods. This relationship is expected to continue in the next 10 years, because switching equipment development time and costs are so great. Imports of switching equipment are expected to be obtained mainly from Europe and Sweden in particular. 7/ The Japanese have

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1/ The Asian Wall Street Journal, Mar. 19, 1984, p. 19.
2/ Telephone Engineer and Management, Dec. 1, 1983, p. 59.
3/ Ibid.
4/ Telephone interview with a financial analyst for an investment firm, Mar. 12, 1984.
5/ Telephone Engineer and Management, Dec. 1, 1983, pp. 61 and 62.
6/ Ibid.
7/ The Journal of Commerce, Mar. 15, 1984, pp. 1 and 5.

attempted to enter the market, for the most part unsuccessfully, and it is not expected that they will be an important force in the U.S. market until the 1990's. 1/

International markets are expected to become more competitive throughout the forecast period. U.S. manufacturers are expected to form cooperative agreements with foreign firms to gain market entry, distribution channels, and R. & D. that would be costly and time consuming to develop independently. 2/ These cooperative agreements are expected to be one of the main sources of export growth in the next decade. The growth rate of exports is expected to decline in the long term because of declining demand in foreign markets served by U.S. manufacturers, the increasing market presence of the Japanese, and an increasingly competitive stance by European switching equipment manufacturers.

Customer premises equipment.--The demand for CPE should grow slightly faster than that for the other segments of the telecommunications equipment market. The CPE market is expected to increase by an average annual rate of nearly 9 percent to $12,929 million in the short term and rise by 9 percent per year to $19,929 million in the long term. The causes of this increase should be the growth in private networks and the purchase of telephone sets by residential customers. Because these purchasers base their decisions mainly on price, these markets have been vulnerable to imports. Import penetration rose from 7.8 percent in 1981 to 18.7 percent in 1983 as import value grew from $633 million to $1,582 million. In the future, imports are expected to grow faster than consumption but not to repeat the growth of the early 1980's. Several factors will slow the growth in imports. American firms should have gained experience in the competitive market and thus be better prepared to deal with competition from imports. The consumer, through experience with purchasing telecommunications equipment, should be more knowledgeable and capable of evaluating factors other than price. The large increase in consumption in some product lines such as telephone sets should have saturated the market and lessened opportunities for imports.

The market for consumer telephones is at the low end of the CPE sector. This product line is the most price sensitive and the most vulnerable to low-cost imported telephones sets. It is also a segment of the market where overproduction has saturated the market. For example, in 1983, imports of telephone sets amounted to 34.2 million units, but total sales to dealers, including domestic production, amounted to only 19.7 million units. This oversupply led to price reduction as low as $4 per unit. 3/ Conditions such as these should lead to a market shakeout early in the short term, 4/ and only the strongest companies will remain. However, the flow of inexpensive imports from Japan, Hong Kong, Korea, and Taiwan is expected to continue through 1993, but at a slower pace than in 1983.

In order to compete with imports from the Far East, some domestic producers are likely to move manufacturing operations offshore to take advantage of low-cost labor. Other domestic firms and some foreign companies

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1/ Telephone Engineer and Management, Dec. 1, 1983, pp. 61 and 62.
2/ Electronic News, Nov. 7, 1983, p. 94.
3/ T.V. Digest, Feb. 27, 1984, p. 15.
4/ Communications Week, Jan. 20, 1984, p. 16.

are expected to choose to compete on a basis other than price. Some consumer phones are expected to be positioned as high-quality or aesthetically pleasing products, and others, as high-technology products with hands-free dialing, hold buttons, and telephone number memory. 1/ Because of the consumers' desire to have telephone sets with these characteristics and because of some degree of dissatisfaction with inexpensive imports, these higher priced products should gain market share.

The demand for key telephone systems should grow more slowly than the CPE market as a whole, because the market for this product is saturated. 2/ However, the key system market should be attracting the attention of many domestic and foreign manufacturers, because the largest U.S. producer of electromechanical systems has discontinued its most popular product. Several domestic firms and foreign firms from countries such as Israel, France, Spain, Brazil, and Japan have already designed electronic key systems in hopes of gaining a share of the market that is using this electromechanical system. 3/ Competition among these producers should be keen, but the change to electronic systems is expected to be slow, and the conversion should not be complete before the 1990's. 4/

The growth in the PBX market should be a product of several factors. In the short term, the effects of a major supplier's pricing program should still be convincing users of older generation PBX's to change to new equipment. 5/ The imposition of access charges is likely to make Centrex users reevaluate their costs and the services they receive. Industry sources indicate that many, if not most, are expected to conclude that owning their own system is more economical and versatile than Centrex. This should boost sales of PBX's through the 1985, especially at the large size end of the market. For the most part, domestic producers are expected to benefit from these gains in the PBX market, 6/ because they are expected to emerge as aggressive competitors in the marketplace. 7/

PBX growth is also a result of the adoption by more and more businesses of automated office systems. PBX's are needed to control the voice and data flows between the various pieces of equipment in the workplace. The demand for PBX's to perform this job should increase from a very small base in the short term, to become a significant share of the market in the long term. Coupled with this would be an increasing demand for data terminals to augment voice telecommunications systems.

Import penetration in the CPE market is expected to continue the upward trend begun in the early 1980's but at a slower pace. Import penetration was 7.8 percent in 1981 and it rose to 18.7 percent by 1983. At the end of the short term it is expected to be nearly 20 percent and by 1993 it should be over 21 percent. The greatest number of units imported is expected to be at

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1/ Ibid.
2/ Electronic News, Dec. 5, 1983, pp. 1, 63, and 66.
3/ Ibid., p. 66.
4/ Communications News, March 1984, p. 39.
5/ Ibid., July 1983, p. 34.
6/ Ibid., January 1984, p. 34.
7/ Electronic News, Dec. 5, 1983 p. 63.

the low end of the price scale and smallest in number at the high end during most of the short term. As technology disseminates it is expected that imports will represent a more even mix of CPE but the bulk of imports should still come from the Far East.

Exports should grow slowly over time but decrease in relation to shipments. They are expected to grow by an average annual rate of just over 4.5 percent, from $495 million in 1983 to $620 million in 1988, and by a little more than 5.5 percent in the long term to $825 million. Exports from the United States are not expected to be price competitive, so they are expected to consist mainly of high-technology items. The rate of growth is expected to be rather low, because it takes large amounts of time and money to adapt technologically complex equipment such as digital PBX's for foreign markets and then to gain market share. The foreign-market share of U.S. firms is expected to grow slowly, but gains should be made in Japan and some European countries as well as in some developing countries.

Cable, wire, and lightguide.--The key development in the cable, wire, and lightguide market is the recent transition from copper to fiber optic cable in many applications. It has been proven that fiber optic cable is superior in high-density transmission performance, requires less maintenance, and is less expensive than copper cable. Therefore, the demand for copper cable is expected to decline, and the demand for fiber optic cable is expected to grow rapidly over the next 10 years. 1/ The U.S. market for cable, wire, and lightguide is expected to grow from $1,763 million in 1983 to $2,500 million in 1988 and $3,500 million in 1993.

Imports of cable, wire, and lightguide are expected to consist almost exclusively of fiber optic and be obtained from Japan and Western Europe in the short term, because in these countries, the use of fiber optic systems is growing rapidly and the domestic industry is well developed. 2/ The growth in imports is expected to be at least 11 percent annually through 1993. The value of imports should rise from $49 million in 1983 to $83 million in 1988 and $140 million in 1993. As U.S. producers become more competitive in the long term, the rate of growth of imports will slow somewhat. As a result, Japanese manufacturers are likely to move their production offshore, and U.S. imports from Korea, Taiwan, and other low-cost producing countries should increase.

The growth in exports of cable, wire, and lightguide should decline in the long term as markets open to U.S. exports become saturated and as U.S. firms are faced with stiff competition from countries such as France and Japan. 3/ The average annual rate of growth in the short term is expected to be approximately 9 percent, and exports should rise to $255 million by 1988. These increases should be made possible by an expanding demand for fiber optic cable worldwide and expansion in the fiber optic undersea cable system. 4/ In the long term, growth in demand in U.S. export markets is expected to slow as more and more systems are in place. Markets not previously penetrated should

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1/ Ibid., May 14, 1984, p. 56.
2/ Communications News, January 1983, pp. 74 and 75.
3/ Ibid., January 1983, pp. 74-5.
4/ Electronic News, Feb. 13, 1984, p. 51.

have developed relationships with foreign suppliers, making them very difficult for U.S. producers to enter. For these reasons, export growth should slow in the long term to about 5.5 percent, and exports should total $332 million by 1993.

The Impact on U.S. Firms

Effects in domestic markets

The effect of trade on U.S. firms supplying the domestic market as a result of the A.T. & T. divestiture is expected to be increasing competitive pressure during the short and long run. In the short run, total imports are expected to increase to about 12 percent of apparent annual consumption. This increase represents both an absolute and a relative increase from the historical trends. Accordingly, it is expected that U.S. firms will face more competitive pressure from abroad then they have previously.

Imports of the equipment subcategories exhibit different trends, but they all show increasing penetration. Transmission equipment imports are expected to capture about 7 percent of the U.S. market by 1988. This is almost double the average annual ratio of imports to consumption experienced during 1978-83. Producers' shipments will increase, but at a lower rate than either consumption or imports. The short-term impact on switching equipment will be less negative than that for the other categories. Import penetration will rise to slightly over 1 percent in the short run from its average of 0.7 percent during 1978-83. This small penetration ratio indicates that U.S. firms will retain much of the domestic market due, in part, to their technological superiority over foreign products and the continuation of traditional purchaser/supplier relationships.

CPE is the subcategory where U.S. firms will face their strongest competition from imported products. Imports have captured a larger portion of this price-sensitive market than any other. During 1978-83, import penetration averaged slightly over 9 percent, but in 1983, it rose to over 18 percent. During the short run, it is expected to rise further to almost 20 percent. U.S. firms are expected to lose market share to low-priced, low-end products principally from the Far East. 1/ In the higher end items, such as digital PBX's, U.S. firms are expected to fare better than for the category as a whole. Cable, wire, and lightguide imports have been small, almost as small as those of switching equipment, relative to consumption. This is expected to continue in the short run, although imports will capture an increased share by 1988. Imports are expected to increase more rapidly for fiber optic lightguide than for the traditional copper wire; those firms producing these products are expected to face increasing competition from foreign, especially Japanese, firms. 2/ Firms producing copper wire are expected to face much less foreign competition.

1/ Transcript of the hearing, pp. 15 and 16, Apr. 24, 1984.
2/ Transcript of the hearing, pp. 36 and 37, Apr 24, 1984.

In the long run, all of the previously mentioned import trends are expected to increase; imports will be growing at a faster rate than either shipments or consumption. Correspondingly, U.S. firms will find themselves in a more competitive environment in the U.S. market vis-a-vis that of foreign firms. Import penetration in the long run is projected to be 8 percent for transmission equipment, 2 percent for switching equipment, 21 percent for CPE, and 4 percent for cable, wire, and lightguide. Import penetration for all imports is predicted to be 13 percent by 1993.

The impact on U.S. firms will vary, depending on the type of equipment produced. Given the low penetration ratio for switching equipment, firms in this product area should be able to continue largely as they have in the past. Competition would more likely come from other domestic firms than from abroad. The CPE market is the reverse case. Competition abroad appears to be coming more from those products where price is the primary competitive factor. In areas where quality plays an important role, U.S. firms are not as likely to be significantly affected if they continue to lead in technology and reduce costs.

Effects in foreign markets

Due to the excess capacity that U.S. firms are likely to experience in the future as a result of imports taking more of a share of the domestic market, there is expected to be an attempt to increase export activity by U.S. firms. The Open Market Scenario indicates that U.S. exports of telecommunications equipment are expected to grow by an average annual rate of 6.6 percent in the near term (1984-88).

Because of the various limitations to exporting to major industrialized countries, including historical supplier relationships, product compatibility, and Government procurement policies, it is expected that most U.S. companies that wish to export rather than produce abroad will, at least in the near term, target developing nations, particularly developing nations with the resources to pay for major overhauls of their telecommunications systems. These countries include Korea and oil-exporting countries.

In addition, bilateral trade agreements such as those signed with Japan and China 1/ are expected to produce opportunities for U.S. firms to export to selected foreign markets in the short and long terms. There is a movement by some members of the GATT to include the telecommunications sector as one of sectors subject to the Agreement on Government Procurement. If this initiative results in an agreement, it may provide some opportunities for U.S. telecommunications equipment abroad, but most likely not until the long term.

In the short term, it is expected that U.S. manufacturers of products which are not price sensitive, such as switching equipment, and transmission equipment, will fare better than those producing low-priced CPE. The annual projected growth rates in the short term for these four product areas are 7.7, 7.2, 9.1, and 4.6 percent, respectively.

In the long term, since the most attractive markets of the advanced developing nations will have been mostly saturated with new systems, U.S.

1/ Communications International, Jan. 20, 1984, pp. 1 and 2.

producers will be forced to turn their attention to less advanced developing nations, probably in South America and perhaps in Africa, as markets for their exports. It is anticipated that many of these countries will be over the financial crises that plague them now and may affect them in the short term. Thus, they should be better able to finance major overhauls of their telecommunications systems. In the international marketplace, the competition in the long run will probably be keener as the global market becomes more saturated with new equipment, making it difficult for U.S. companies to export.

The annual growth rates for exports of transmission equipment, switching equipment, CPE, and cable, wire, and lightguide in the long term are expected to be 7.6, 5.6, 5.9, and 5.4 percent, respectively. All are lower than in the short term, with the exception of CPE. The reason for the faster growth rate of CPE in the long term compared with that of the short term is that many purchasers of CPE are expected to realize that higher quality is more important than lower price, and they are expected to shift some of their purchases of CPE from the Far East to the United States. This assumes that U.S. producers will continue to lead in technology and reduce costs.

APPENDIX A

LETTER OF REQUEST FROM CHAIRMAN, COMMITTEE ON FINANCE, UNITED STATES SENATE

United States Senate

COMMITTEE ON FINANCE
WASHINGTON, D.C. 20510

November 15, 1983

Honorable Alfred E. Eckes
Chairman
U.S. International Trade Commission
701 E Street, N.W.
Washington, D.C. 20436

Dear Mr. Chairman:

The Senate Finance Committee requests that the United States International Trade Commission conduct an investigation under section 332 of the Tariff Act of 1930 on the possible implications of recent court and regulatory changes and of the AT&T divestiture on trade in telecommunications equipment.

In particular, we are interested in obtaining information on the possible trade consequences of these actions as they relate to U.S. imports of foreign made equipment and to U.S. exports of domestically manufactured telecommunications equipment. A further area of interest is the development of data and information relating to current and potential foreign suppliers of this equipment and their plans and capabilities regarding penetration of the U.S. market -- the largest in the world for telecommunication equipment. In addition, the Committee wishes the Commission to update data pertinent to these issues originally presented in USITC investigation No. 332-92, A Baseline Study of the Telephone Terminal and Switching Equipment Industry.

Each of the following should be specifically addressed in the study:

(1) A profile of the U.S. telecommunications industry both with a current and potential view toward evaluating its present and future competitive position in the U.S. and foreign markets. This issue should address possible changes and steps the U.S. industry may take in light of the recent actions and the divestiture. To the extent pertinent, a brief analysis of foreign industry plans and capabilities should be included.

(2) An analysis of key economic factors in the U.S. market for telecommunications equipment including U.S. consumption, production, trade and other relevant factors, 1978-1983.

(3) Proposed trade nomenclature (both import and export) which would assure an adequate information base on telecommunication equipment for future analysis of trade trends.

(4) The impact of the divestiture on imports of telecommunication equipment, which addresses both the type of equipment likely to be imported and the expected level of imports in the short run (5 years) and the long run (10 years). The level and composition of future import trends should be addressed by using appropriate scenarios based on projected hypothetical import levels.

It would be appreciated if the final report would be submitted to the Committee by June 18, 1984.

Sincerely,

Bob Dole
Chairman

APPENDIX B

NOTICE OF INSTITUTION OF INVESTIGATION NO. 332-172 AND NOTICE OF PUBLIC HEARING IN CONNECTION THEREWITH

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

(332-172)

Changes in the U.S. Telecommunications Industry and the Impact on U.S. Telecommunications Trade

AGENCY: United States International Trade Commission

ACTION: Following receipt on November 15, 1983, of a request from the Committee on Finance, U.S. Senate, the Commission instituted investigation No. 332-172 under section 332(g) of the Tariff Act of 1930 (19 U.S.C. 1332(g)) for the purpose of gathering information in order that it might report by June 18, 1984, to the Committee on the possible implications of recent court and regulatory changes and of the AT&T divestiture on trade in telecommunications equipment.

EFFECTIVE DATE: December 6, 1983

FOR FURTHER INFORMATION CONTACT: Mr. Harold Graves or Mr. William Fletcher, Machinery and Equipment Division, United States International Trade Commission, 701 E Street NW., Washington, D.C. 20436 (telephone 202-523-0360 or 202-523-0378, respectively).

BACKGROUND: As requested by the Senate Finance Committee, the study will provide information on the possible trade consequences of court and regulatory changes as they relate to U.S. imports of foreign made equipment and to U.S. exports of domestically manufactured telecommunications equipment. In particular the study will present (1) a profile of the U.S. telecommunications industry with emphasis on its present and future competitive position in U.S. and foreign markets in light of court and regulatory actions, especially the impending AT&T divestiture, (2) an analysis of key economic factors in the U.S. market for telecommunications equipment including consumption, shipments, trade and other relevant factors, (3) proposed trade nomenclature, import and exports, to provide an accurate information base on telecommunications equipment, and (4) the estimated impact of the divestiture on the level and composition of trade in the near and long term. A copy of the letter requesting the study is available for public inspection in the Office of the Secretary, U.S. International Trade Commission, 701 E Street NW., Washington D.C. 20436 (202-523-5178).

WRITTEN SUBMISSIONS: While no public hearing is scheduled for this study, interested persons are invited to submit written statements concerning the investigation. Written statements should be received by the close of business on April 16, 1984. Commercial or financial information which a submitter desires the Commission to treat as confidential must be submitted on separate sheets of paper, each clearly marked "Confidential Business Information" at the top. All submissions requesting confidential treatment must conform with

the requirements of section 201.6 of the Commission's Rules of Practice and Procedure (19 CFR 201.6). All written submission, except for confidential business information, will be made available for inspection by interested persons. All submissions should be addressed to the Secretary at the Commission's office in Washington, D.C.

By order of the Commission.

Kenneth R. Mason
Secretary

Issued: December 6, 1983

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

(332-172)

Changes in the U.S. Telecommunications Industry and the Impact on U.S. Telecommunications Trade

AGENCY: United States International Trade Commission

ACTION: The Commission will hold a public hearing for the purpose of affording all interested parties an opportunity to present views on the possible trade consequences of court and regulatory changes as they relate to U.S. imports of foreign made equipment and to U.S. exports of domestically manufactured telecommunications equipment. The initial notice of the investigation indicating the scope of the study, contact persons, and other related information was published in the Federal Register of December 14, 1983 (48 F.R. 55643).

PUBLIC HEARING: A public hearing in connection with the investigation will be held in the Commission Hearing Room, 701 E Street NW., Washington, D.C. 20436, beginning at 10:00 a.m., on April 24, 1984, to be continued on April 25, 1984, if required. All persons shall have the right to appear by counsel or in person, to present information and to be heard. Requests to appear at the public hearing should be filed with the Secretary, United States International Trade Commission, 701 E Street NW., Washington, D.C. 20436, not later than April 17, 1984.

WRITTEN SUBMISSIONS: In lieu of or in addition to appearance at the public hearing, interested persons are invited to submit written statements concerning the investigation by April 17, 1984. Commercial or financial information which a submitter desires the Commission to treat as confidential must be submitted on separate sheets of paper, each clearly marked "Confidential Business Information" at the top. All submissions requesting confidential treatment must conform with the requirements of section 201.6 of the Commission's Rules of Practice and Procedure (19 CFR 201.6). All written submissions, except for confidential business information, will be made available for inspection by interested persons. All submissions should be addressed to the Secretary at the Commission's office in Washington, D.C.

By order of the Commission.

Kenneth R. Mason
Secretary

Issued: December 21, 1983

APPENDIX C

CALENDAR OF PUBLIC HEARING

CALENDAR OF PUBLIC HEARING

Those listed below appeared as witnesses at the United States International Trade Commission's hearing:

Subject : Changes in the U.S. Telecommunications Industry and the Impact on U.S. Telecommunications Trade

Inv. No. : 332-172

Date and time: April 24, 1984 - 10:00 a.m.

Sessions were held in connection with the investigation in the Hearing Room of the United States International Trade Commission, 701 E Street, N.W., in Washington.

WITNESS AND ORGANIZATION

Verner, Liipfert, Bernhard and McPherson--Counsel
Washington, D.C.
on behalf of

The Electronic Industries Association Telecommunications Group

Peter Bennett, Staff Vice President

Alan Wm. Wolff)
Thomas R. Howell) --OF COUNSEL

Robert B. Wood, Director of Research, International Brotherhood of Electrical Workers, AFL/CIO

Anderson, Hibey, Nauheim & Blair--Counsel
Washington, D.C.
on behalf of

The Communication Industries Association of Japan

Eric I. Garfinkel)
Stanton D. Anderson) --OF COUNSEL

APPENDIX D

GLOSSARY OF ABBREVIATIONS, ACRONYMS, AND INITIALISMS

Glossary of Abbreviations, Acronyms, and Initialisms

Company Names

AT&T	American Telephone and Telegraph	(USA)
CGE	Compagne Generale Electricite	(France)
COMSAT	Communications Satellite Corp.	(USA)
GEC	General Electric Company	(UK)
GTE	General Telephone and Electronics	(USA)
ITT	International Telephone and Telegraph	(USA)
MCI	Microwave Communications, Inc.	(USA)
NEC	Nippon Electric Co.	(Japan)
NTT	Nippon Telephone and Telegraph	(Japan)
RCA	Radio Corporation of America	(USA)
SBS	Satellite Business Systems	(USA)
WE	Western Electric (subs. AT&T)	(USA)

Government and International Bodies

CCITT	International Consultative Committee for Telephone and Telegraph	(UN)
EC	European Community	(Various)
FCC	Federal Communications Commission	(USA)
GATT	General Agreements on Tariffs and Trade	(Various)
ICC	Interstate Commerce Commission	(USA)
ITU	International Telecommunications Union	(UN)
UN	United Nations	(UN)
USITC	United States International Trade Commission	(USA)

Common Carriers and Telecommunications Adminstrations

BOC	Bell Operating Company	(USA)
MPT	Ministry of Posts and Telecommunications	(Various)
OCC	Other Common Carriers	(USA)
PTT	Post, Telephone, and Telegraph Administration	(Various)
RHC	Regional Holding Company	(USA)
SPCC	Specialized Common Carriers	(USA)
STA	Swedish Telecommunications Administration	(Sweden)

Apparatus and Equipment

CO	Central Office
CPE	Customer Premises Equipment
CRT	Cathode Ray Tube

Apparatus and Equipment—Continued

EKTS	Electronic Key Telephone System
KTS	Key Telephone System
Modems	Modulator-demodulators
PBX	Private Branch Exchange
UARTS	Universal Asynchronous Receiver Transmitters

General

C.I.F.	Customs, Insurance, and Freight
F.O.B.	Freight on Board
GNP	Gross National Product
GSP	Generalized System of Preferences
LDDC	Least Developed Developing Country
MTN	Multinational Trade Negotiations
OEM	Original Equipment Manufacturer
OMA	Orderly Marketing Agreement
R. & D.	Research and Development
R.F.	Radio Frequency
TSUS	Tariff Schedules of the United States
TSUSA	Tariff Schedules of the United States Annotated
Schedule B	Statistical Classification of Domestic and Foreign Commodities Exported from the United States

APPENDIX E

LETTER OF FEBRUARY 29, 1984, TO THE CHAIRMAN, COMMITTEE ON FINANCE, UNITED STATES SENATE, FROM CHAIRMAN, U.S. INTERNATIONAL TRADE COMMISSION, CONTAINING PROPOSED NOMENCLATURE, AMENDMENTS THERETO, AND A COMPARISON OF THE CURRENT TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1984) AND SCHEDULE B TO THE PROPOSED AMENDED SCHEDULES

UNITED STATES INTERNATIONAL TRADE COMMISSION

WASHINGTON, D.C. 20436

February 29, 1984

Honorable Bob Dole
Chairman, Committee on Finance
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

In your letter of November 15, 1983, you requested that the U.S. International Trade Commission conduct an investigation under section 332 of the Tariff Act of 1930 on the possible implications of recent court and regulatory changes and of the AT&T divestiture on trade in telecommunications equipment and report to you by June 18, 1984. You requested as part of that investigation that the Commission provide to you proposed nomenclature (both import and export) which would assure an adequate trade information collection base on telecommunications equipment for future analysis of trade trends.

Pursuant to discussions with your staff who requested the proposed nomenclature by the end of February 1984, the Commission has prepared the enclosed proposed nomenclature. If during the course of the Commission's investigation, information is developed which requires changes in the proposed nomenclature, such changes will be reflected in the Commission's final report.

Please contact us if we can be of further assistance.

Sincerely,

Alfred Eckes
Chairman

Enclosure

SECTION I

Proposed amendments to the Tariff Schedules of the United States (TSUS) to establish more precise nomenclature for trade in telecommunications products

1. Amendments to subpart G, part 4, schedule 6, TSUS:

A. Delete item 676.15 and substitute the following, in numerical sequence and subordinate to the superior heading to item 676.15, in lieu thereof:

	Accounting, computing, and other data processing machines:			
676.13	Machines designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks	4.5% ad val.	3.9% ad val.	35% ad val.
676.14	Other	4.5% ad val.	3.9% ad val.	35% ad val.

B. Delete item 676.30 and substitute the following in lieu thereof:

	Office machines not specially provided for:			
676.28	Machines designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks	4.2% ad val.	3.7% ad val.	35% ad val.
676.29	Other	4.2% ad val.	3.7% ad val.	35% ad val.

C. Delete item 676.52 and substitute the following, in numerical sequence and subordinate to the superior heading to item 676.50, in lieu thereof:

	Other:			
676.53	Parts designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks	4.5% ad val.	3.9% ad val.	35% ad val.
676.54	Other	4.5% ad val.	3.9% ad val.	35% ad val.

2. Amendments to subpart H, part 4, schedule 6, TSUS:

A. Delete item 678.50 and substitute the following in lieu thereof:

	Machines not specially provided for, and parts thereof:			
678.49	Machines designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks	4.2% ad val.	3.7% ad val.	35% ad val.
678.53	Other, including parts	4.2% ad val.	3.7% ad val.	35% ad val.

B. Redesignate item 678.51 as 678.55 with the article description therefor subordinate to the article description for items 678.49 and 678.53, as added by the previous subsection.

3. Amendments to part 5, schedule 6, TSUS:

A. Add new headnote, numbered 6, to part 5 as follows:

6. For purposes of the tariff schedules "entertainment broadcast band receivers" means those radio receivers designed principally to receive signals in the AM (550-1650 KHz) and FM (88-108 MHz) entertainment broadcast bands, whether or not capable of receiving signals on other bands (e.g., aviation, television, marine, public safety, industrial, and citizens band).

B. Delete items 684.62 and 684.64 and substitute the following, in numerical sequence and subordinate to the superior heading to item 684.62, in lieu thereof:

	Telephonic apparatus and instruments and parts thereof:			
684.57	Telephone switching apparatus (including private branch exchange and key system switching apparatus), and parts and components thereof	8.5% ad val.		35% ad val.
684.58	Telephone sets and other terminal equipment and parts thereof	8.5% ad val.		35% ad val.
684.59	Other	8.5% ad val.		35% ad val.
	Other:			
684.65	Switching apparatus and parts thereof	5.6% ad val.	4.7% ad val.	35% ad val.
684.66	Terminal apparatus (including teleprinting and teletypewriting machines) and parts thereof	5.6% ad val.	4.7% ad val.	35% ad val.
684.67	Other	5.6% ad val.	4.7% ad val.	35% ad val.

C. Delete items 685.21 through 685.31, inclusive, and substitute the following, in numerical sequence and subordinate to the superior heading to item 685.21, in lieu thereof:

685.20	Radio receivers, other than solid-state (tubeless)	6% ad val.		35% ad val.
	Solid-state (tubeless) radio receivers:			
685.21	Designed for motor-vehicle installation	8.9% ad val.	8% ad val.	35% ad val.
	Other:			
685.22	Entertainment broadcast band receivers	7.7% ad val.	6% ad val.	35% ad val.
685.23	Other	7.7% ad val.	6% ad val.	35% ad val.
	Transceivers:			
	Citizens band:			
685.24	Hand-held	6% ad val.		35% ad val.
685.25	Other	6% ad val.		35% ad val.
685.26	Low-power radiotelephonic transceivers operating on frequencies from 49.82 to 49.90 MHz	3.8% ad val.	2.4% ad val.	35% ad val.
685.27	Other transceivers	6% ad val.		35% ad val.
	Other transmission apparatus incorporating reception apparatus:			
685.28	Cordless handset telephones	6% ad val.		35% ad val.
685.29	Other	6% ad val.		35% ad val.
	Other:			
685.30	Transmitters	6% ad val.		35% ad val.
685.31	Other, including parts	6% ad val.		35% ad val.
685.32	Radiotelegraphic and radiotelephonic transmission and reception apparatus, and radiobroadcasting transmission and reception apparatus, if certified for use in civil aircraft (see headnote 3, part 6C, schedule 6)	Free		

D. Add new item 685.39, in numerical sequence and at the same hierarchical level as the article description for item 685.40, as follows:

685.39	Telephone answering machines, and parts thereof.....	4.5% ad val.	3.9% ad val.	35% ad val.

E. Amend the article description for item 685.40 to read as follows:

"Tape recorders and dictation recording and transcribing machines (other than telephone answering machines), and parts thereof"

F. Delete item 685.50 and substitute the following in lieu thereof:

	Other:			
685.48	Combination articles designed for for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks.....	5.9% ad val.	4.9% ad val.	35% ad val.
685.49	Other.....	5.9% ad val.	4.9% ad val.	35% ad val.

G. Delete item 688.15 and substitute the following, in numerical sequence and subordinate to the superior heading to item 688.10, in lieu thereof:

	Other:			
688.17	With modular telephone connectors.....	5.8% ad val.	5.3% ad val.	35% ad val.
688.18	Other.....	5.8% ad val.	5.3% ad val.	35% ad val.

H. Redesignate item 688.16 as 688.19 with the article description therefor subordinate to the article description for items 688.17 and 688.18, as added by the previous subsection.

I. Delete item 688.43 and substitute the following, in numerical sequence and subordinate to the superior heading to item 688.34, in lieu thereof:

	Other:			
688.41	Equipment designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks.....	4.5% ad val.	3.9% ad val.	35% ad val.
688.42	Other.....	4.5% ad val.	3.9% ad val.	35% ad val.

4. Amendments to subpart A, part 2, schedule 7, TSUS:

A. Add new items 707.90 and 707.92, and the superior heading thereto, in numerical sequence as follows:

	Optical fibers, optical fiber bundles, and optical fiber cables; all the foregoing whether mounted or not mounted:			
707.90	Optical fiber bundles.....	13.1% ad val.	8.4% ad val.	65% ad val.
707.92	Optical fibers and optical fiber cables.....	13.1% ad val.	8.4% ad val.	85% ad val.

B. Redesignate items 708.09 and 708.29 as 708.10 and 708.30, respectively.

5. Conforming amendments:

(1) The rate of duty in column numbered 1 of the TSUS for each item set forth below in the column headed "A" (as added by the preceding subsection) shall be subject to all staged rate reductions for the corresponding item set forth below in the column headed "B" which were proclaimed by the President before the date of the enactment of this Act.

(2) Whenever the rate of duty specified in column numbered 1 of the TSUS for each item set forth below in the column headed "A" is reduced to the same level, or to a lower level, as the corresponding rate of duty specified in the column entitled "LDDC" of the TSUS for such item, the rate of duty in such "LDDC" column shall be deleted.

A	B
676.13	676.15
676.14	676.15
676.28	676.30
676.29	676.30
676.53	676.52
676.54	676.52
678.49	678.50
678.53	678.50
684.65	684.64
684.66	684.64
684.67	684.64
685.21	685.21
685.22	685.24
685.23	685.24
685.26	685.26
685.39	685.40
685.48	685.50
685.49	685.50
688.17	688.15
688.18	688.15
688.41	688.43
688.42	688.43
707.90	708.29
707.92	708.09

SECTION II

The following TSUS item numbers, as added by the proposed language in Section I. are considered to be wholly or partially composed of "telecommunications apparatus" (as described in Section V of this report):

TSUS Item No.	
676.13	685.39
676.28	685.48
676.53	688.17
678.49	688.41
684.57	707.92
684.58	
684.59	
684.65	
684.66	
684.67	
685.20	
685.21	
685.23	
685.27	
685.28	
685.29	
685.30	
685.31	
685.32	

SECTION III

Proposed amendments to Schedule B to establish more precise nomenclature for trade in telecommunications products

1. Amendments to subpart G, part 4, schedule 6, Schedule B:

A. Add the following above item 676.2600.

676.2550	Machines designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks

B. Add the following above item 676.3040.

676.3038	Machines designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks

C. Add the following above item 676.5560.

676.5550	Parts designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks.

2. Amendment to subpart H, part 4, schedule 6, Schedule B:

A. Add the following above item 678.5002.

678.5001	Machines not specially provided for designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks

3. Amendments to part 5, schedule 6, Schedule B:

A. Delete items 684.6210 through 684.6440 and substitute the following in lieu thereof:

	:	Telephonic apparatus and instruments and parts thereof:
684.5700	:	Telephone switching apparatus (including private branch exchange and key system switching apparatus), and parts and components thereof
684.5800	:	Telephone sets and other terminal equipment and parts thereof
684.5900	:	Other
	:	Other:
684.6500	:	Switching apparatus and parts thereof
684.6600	:	Terminal apparatus (including teleprinting and teletypewriting machines) and parts thereof
684.6700	:	Other

B. Add new item 685.3905, in numerical sequence and at the same hierarchical level as the article description for item 685.3910, as follows:

	:	
685.3905	:	Telephone answering machines, and parts thereof
	:	

C. Add the following above item 685.5310.

	:	
	:	Other:
685.5305	:	Combination articles designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks
	:	

D. Delete item 688.0220 and substitute the following in lieu thereof:

	:	
	:	Telephone and telegraph:
688.0230	:	With modular telephone connectors
	:	
688.0235	:	Other
	:	

E. Add the following above item 688.4030.

	:	
688.4022	:	Equipment designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks
	:	

SECTION IV

The following Schedule B item numbers (including those added by Section III) are considered to be wholly or partially composed of "telecommunications apparatus" (as described in Section V of this report):

Schedule B No.	
676.2550	685.5305
676.3038	688.0230
676.5550	688.0235
678.5001	688.4022
684.5700	708.0110
684.5800	
684.5900	
684.6500	
684.6600	
684.6700	
685.2630	
685.2642	
685.2650	
685.2660	
685.2710	
685.2715	
685.2720	
685.2725	
685.2735	
685.2740	
685.2745	
685.2750	
685.2755	
685.2760	
685.2765	
685.3905	

SECTION V

Background

Development of a product nomenclature suitable for regulating and monitoring trade in telecommunications products was to be addressed as part of the investigation requested of the Commission to assess the trade impact brought about by deregulation, divestiture, and other judicial and regulatory actions. In order to accurately measure import consumption and export markets for these telecommunications products, it was necessary to develop more precise nomenclature for incorporation into the Tariff Schedules of the United States Annotated (TSUSA) and the export schedule (Schedule B).

Methodology

The development of this nomenclature was done in two phases. First, since the term "telecommunications" has different meanings in both domestic and international usage, a general understanding needed to be reached regarding the kinds of goods to be covered. Second, all of the individual line items in both the TSUSA and Schedule B were examined in light of this understanding. Where items contained significant trade in products considered to fall within the investigation, as well as important trade in nontelecommunications goods, new tariff categories were proposed to isolate the telecommunications equipment. Third, the items (as modified by the nomenclature revisions) considered to principally contain telecommunications equipment were separately provided for.

Scope

For the purposes of investigation No. 332-172, "telecommunications" embraces the systematic use of electric current, electromagnetic waves, light

(including infrared) waves, or other electromagnetic phenomena for transmitting, routing, switching, receiving, conveying, converting, or terminating signs, signals, writings, facsimile, images, sounds, data, or other intelligence from one point to another. The radio or television broadcast or cable transmission to residential (i.e., noncommercial) audiences of entertainment or educational programs and signals, and the use of electromagnetic signals for search, detection, location, navigation or radio remote control were not considered to be within the scope of the study.

The method of signaling is not limited and may be accomplished by (1) encoded representation of the original intelligence (including, but not limited to, phase, digital, or telegraphic codes); (2) analogous representation of the original intelligence (analog signaling or modulation); or (3) any combination of the foregoing techniques.

For the purposes of investigation No. 332-172, "telecommunications apparatus" is intended to embrace those products, commodities, components, equipment, systems or combinations thereof which are used chiefly to provide telecommunications services or are used in the composition of telecommunications systems or networks, or are capable of use with (or attachment to) such networks or systems. These telecommunications systems and networks may consist of wire lines, light guides, coaxial cables, radio relay links, satellite relay links, and combinations thereof. Such networks include, but are not limited to, national switched, private-line, value-added, local area, or other networks. The telecommunications systems or networks may be publicly or privately owned or operated.

Equipment used within the system for the transmission or routing of information from one destination to another is "telecommunications apparatus," as are those products used to terminate the network at the point of origin, destination, or interconnection. All equipment, regardless of use, required to be registered in accordance with the rules and regulations of the Federal Communications Commission (FCC) is also considered to be "telecommunications apparatus." Fittings, bits and pieces, construction material, including poles, discrete parts (including but not limited to, transistors, integrated circuits, resistors, capacitors, and conductors), and other similar elementary pieces are not included in this definition. Likewise, radio apparatus not designed for connection to telecommunications networks which is used by the general public for amusement (e.g., Citizens Band transceivers, and so forth) is not "telecommunications apparatus." Electrical bells, sirens, indicator panels, burglar and fire alarms, and other sound or visual signaling apparatus, were also excluded from the scope of this report.

Administration of the proposed tariff provisions

In order to facilitate administration of the proposed tariff provisions and to improve data collection, registration of telephone and telegraph apparatus as now required by the FCC should also be required prior to importation of all telecommunications products into the customs territory of the United States. And, appropriate documentation attesting to such registration and giving the assigned FCC registration number should be required to accompany the entry papers.

Proposed amendments to the TSUS relating to administrative enforcement

1. Amendment to subpart G, part 4, schedule 6, TSUS:

   A. Add new headnote, numbered 3, as follows:

      3. Articles provided for in items 676.13, 676.28, 676.53, or 678.49, are subject to entry in accordance with headnote 7 to part 5 of this schedule.

2. Amendment to part 5, schedule 6, TSUS:

   A. Add new headnote, numbered 7, to part 5 as follows:

      7. The provisions of this headnote apply to articles provided for in items 676.13, 676.28, 676.53, or 678.49, part 4G, or in items 684.57, 684.58, 684.59, 684.65, 684.66, 684.67, 685.20, 685.21, 685.23, 685.27, 685.28, 685.29, 685.30, 685.31, 685.39, 685.48, or 688.41, part 5, schedule 6.

      (a) The entry for consumption of the articles provided for in the tariff items identified above which are required by the Federal Communications Commission to be marked and certified or registered prior to use in the United States is prohibited unless, at the time of entry, such articles are marked and certified or registered in accordance with Part 15 or Part 68 of the rules of the Federal Communications Commission (47 C.F.R. Pts. 15, 68); except that such articles may be entered under bond by the importer for the sole purpose of obtaining such certification or registration prior to use in the United States.

      (b) The Secretary of the Treasury is hereby authorized and directed to prescribe methods and regulations for carrying out the provisions of this headnote. The Secretary of the Treasury is further authorized and directed to procure from the Federal Communications Commission lists of articles which are required by the Commission to be marked and certified or registered prior to use in the United States.

Proposed amendments to the TSUS and the Tariff Act of 1930 relating to communications satellites

1. Amendment to part 5, schedule 6, TSUS:

   A. Add new items 684.80 and 684.82 and the superior heading thereto, in numerical sequence, as follows:

	Communications satellites (however provided for in this part) and parts thereof:		
684.80	To be launched in the United States for use in a global communications satellite system	Free	Free
684.82	Other	Free	Free

2. Amendment to subpart A, part 3, schedule 8, TSUS:

   A. Amend the superior heading to item 837.00 to read as follows:

   "Articles for the National Aeronautics and Space Administration and articles (other than communications satellites and parts thereof) imported to be launched into space under launch services agreements with the National Aeronautics and Space Administration:"

3. Amendment to subpart B, part 3, schedule 8, TSUS:

   A. Amend the superior heading to item 842.10 to read as follows:

   "Upon the request of the Department of State, articles (other than communications satellites and parts thereof) which are the property of a foreign government or of a public international organization:"

4. Amendment to the Tariff Act of 1930:

   A. Subsection (a) of section 322 of the Tariff Act of 1930 (19 U.S.C. 1322(a)) is amended by adding at the end thereof the following:

   "The authority delegated to the Secretary by this subsection shall not extend to communications satellites and components and parts thereof."

Proposed amendments to Schedule B relating to communications satellites

1. Amendments to part 5, schedule 6, Schedule B:

   A. Add new items 684.8000 and 684.8200 and the superior heading thereto, in numerical sequence, as follows:

      Communications satellites (however provided for in this part) and parts thereof:

      684.8000 To be launched in a foreign country for use in a global communications satellite system

      684.8200 Other

SECTION II

The following TSUS item numbers, as added by the proposed language in Section I, are considered to be wholly or partially composed of "telecommunications apparatus" (as described in Section V of this report):

TSUS Item No.	
676.13	685.39
676.28	685.48
676.53	688.17
678.49	688.41
684.57	707.92
684.58	
684.59	
684.65	
684.66	
684.67	
684.80	
685.20	
685.21	
685.23	
685.27	
685.28	
685.29	
685.30	
685.31	
685.32	

Note: This page supercedes the same page submitted to you earlier.

SECTION IV

The following Schedule B item numbers (including those added by Section III) are considered to be wholly or partially composed of "telecommunications apparatus" (as described in Section V of this report):

Schedule B No.	
676.2550	685.5305
676.3038	685.0230
676.5550	688.0235
678.5001	688.4022
684.5700	708.0110
684.5800	
684.5900	
684.6500	
684.6600	
684.6700	
684.8000	
685.2630	
685.2642	
685.2650	
685.2660	
685.2710	
685.2715	
685.2720	
685.2725	
685.2735	
685.2740	
685.2745	
685.2750	
685.2755	
685.2760	
685.2765	
685.3905	

Note: This page supercedes the same page submitted to you earlier.

On the following pages, a side by side comparison of the current TSUS and Schedule B to the proposed amended schedules is shown.

Current nomenclature U.S. imports		Proposed nomenclature U.S. imports	
Item	Articles	Item	Articles
676.15	Accounting, computing, and other data-processing machines.		Accounting, computing, and other data-processing machines:
		676.13	Machines designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks.
		676.14	Other
	* * *		* * *
676.30	Office machines not specially provided for.		Office machines not specially provided for:
		676.28	Machines designed for connection to telegraphic telephonic apparatus or apparatus or instruments or to telegraphic or telephonic networks.
		676.29	Other
	* * *		* * *
	Parts of the foregoing:		
676.52	Other		Other:
		676.53	Parts designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks.
		676.54	Other
	* * *		* * *

Current nomenclature U.S. imports		Proposed nomenclature U.S. imports	
Item	Articles	Item	Articles
678.50	Machines not specially provided for, and parts thereof.		Machines not specially provided for and parts thereof:
		678.49	Machines designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic network.
	* * *	678.53	Other, including parts
			* * *
			Add new headnote, numbered 6, to part 5 as follows:
			6. For purposes of the tariff schedules "entertainment broadcast band receivers" means those radio receivers designed principally to receive signals in the AM (550-1650-KHz) and FM (88-108 MHz) entertainment broadcast bands, whether or not capable of receiving signals on other bands (e.g., aviation, television, marine, public safety, industrial, and citizens band).
			* * *
684.62	Telephonic apparatus and instruments and parts thereof.		Telephonic apparatus and instruments and parts thereof:
		684.57	Telephone switching apparatus (including private branch exchange and key system switching apparatus), and parts and components thereof.
	* * *	684.58	Telephone sets and other terminal equipment and parts thereof.
		684.59	Other
684.64	Other		Other:
		684.65	Switching apparatus and parts thereof.
	* * *		
		684.66	Terminal apparatus (including teleprinting and teletypewriting machines) and parts thereof.
		684.67	Other
			* * *

Current nomenclature U.S. imports		Proposed nomenclature U.S. imports	
Item	Articles	Item	Articles
	(Communications satellite are currently provided for it items 837.00 when imported for the National Aeronoutics and Space Administration and 842.10 when imported and are the property of a foreign government or of a public international organization.)		Add new item 684.80 and 684.82 and the superior heading thereto, in numerical sequence, as follows:
			Communications satellites (however provided for in this part) and parts thereof:
		684.80	To be launched in the United States for use in a global communications satellite system.
		684.82	Other
			* * *
	(Currently TSUSA item 685.2950)	685.20	Radio receivers, other than solid-state (tubeless)
685.21	Solid-state (tubeless) radio receivers		Solid-state (tubeless) radio receivers:
	Designed for motor-vehicle installation.	685.21	Designed for motor-vehicle installation
	* * *		
685.24	Other		Other
		685.22	Entertainment broadcast band receivers
	* * *		
		685.23	Other
685.26	Low-power radiotelephonic transceivers operating on frequencies from 49.82 to 49.90 megahertz.		Transceivers:
			Citizens band:
		685.24	Hand-held
		685.25	Other
	* * *	685.26	Low-power radiotelephonic transceivers operating on frequencies from 49.82 to 49.90 MHz
685.27	Other: Citizens Band (CB) radio transceivers (except hand-held)	685.27	Other transceivers
685.29	Other		Other transmission apparatus incorporating reception apparatus:
	* * *	685.28	Cordless handset telephones
		685.29	Other
			Other:
		685.30	Transmitters
		685.31	Other, including parts

Current nomenclature U.S. imports		Proposed nomenclature U.S. imports	
Item	Articles	Item	Articles
685.31	Radiotelegraphic and radio telephonic transmission and reception apparatus, if certified for use in civil aircraft (see headnote 3, pt. 6C, schedule 6).	685.32	Radiotelegraphic and radio-telephonic transmission and reception apparatus, and radiobroadcasting transmission and reception apparatus, if certified for use in civil aircraft (see headnote 3, pt. 6C, schedule 6).
	* * *		* * *
	(Currently TSUSA item 685.4009	685.39	Telephone answering machines, and parts thereof.
			* * *
685.40	Tape recorders and dictation recording and transcribing machines, and parts thereof.		Tape recorders and dictation recording and transcribing machines (other than telephone answering machines), and parts thereof.
	* * *		* * *
685.50	Other		Other:
		685.48	Combination articles designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephone networks.
	* * *		
		685.49	Other
			* * *
688.15	Other		Other:
	* * *	688.17	With modular telephone connectors.
		688.18	Other
			* * *
688.43	Other		Other:
	* * *	688.41	Equipment designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks.
		688.42	Other
			* * *

Current nomenclature U.S. imports		Proposed nomenclature U.S. imports	
Item	Articles	Item	Articles
	Lenses, prisms, and other optical elements, all of the foregoing whether mounted or not mounted:		Optical fibers, optical fiber bundles, and optical fiber cables; all the foregoing whether mounted or not mounted:
		707.90	Optical fiber bundles
		707.92	Optical fibers and optical fiber cables.

Current nomenclature U.S. exports		Proposed nomenclature U.S. exports	
Item	Articles	Item	Articles
	Automatic data-processing machines and units thereof; office machines, not specially provided for, incorporating or designed to incorporate or be used with a central processing unit; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not specially provided for:		
	* * *		
		Add the following above item 676.2600	
		676.2550	Machines designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks.

Current nomenclature U.S. exports		Proposed nomenclature U.S. exports	
Item	Articles	Item	Articles
	Office machines not specially provided for:		
	* * *		
		Add the following above item 676.3040	
		676.3038	Machines designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks.
			* * *
		Add the following above item 676.5560	
		676.5550	Parts designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks.
			* * *
	Machines not specially provided for, and parts thereof:		
	* * *	Add the following above item 678.5002.	
		678.5001	Machines not specially provided for designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks.
			* * *
	Telephonic apparatus and instruments, and parts thereof:		Telephonic apparatus and instruments and parts thereof:
684.6210	Telephone switching and switchboard equipment and parts and components thereof.	684.5700	Telephone switching apparatus (including private branch exchange and key system switching apparatus), and parts and components thereof.
684.6220	Telephone instruments		

Current nomenclature U.S. exports		Proposed nomenclature U.S. exports	
Item	Articles	Item	Articles
684.6240	Other (including parts not specifically provided for).	684.5800	Telephone sets and other terminal equipment and parts thereof.
	Telegraph equipment and parts thereof:	684.5900	Other
684.6420	Teleprinting and teletype writing machines.		Other:
684.6440	Other telegraph apparatus and instruments, and parts.	684.6500	Switching apparatus and parts thereof.
	* * *	684.6600	Terminal apparatus (including teleprinting and teletype-writing machines) and parts thereof.
		684.6700	Other
			* * *
	Tape players, and parts thereof:		
		685.3905	Telephone answering machines, and parts thereof.
			* * *
			Other:
	Combinations of the foregoing, and parts thereof:		
	* * *		
		685.5305	Combination articles designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks.
			* * *
	Communication wire and cable, except fiber optic:		

Current nomenclature U.S. exports		Proposed nomenclature U.S. exports	
Item	Articles	Item	Articles
688.0220	Telephone and telegraph		Telephone and telegraph:
		688.0230	With modular telephone connectors
		688.0235	Other
			* * *
	Electrical articles, n.s.p.f.; and electrical parts of articles, n.s.p.f.:		
	* * *	Add the following above item 688.4030.	
		688.4022	Equipment designed for connection to telegraphic or telephonic apparatus or instruments or to telegraphic or telephonic networks.
			* * *

APPENDIX F

TRADE BARRIERS REPORTED BY RESPONDENTS TO THE COMMISSION'S QUESTIONNAIRES

Table F-1.--Number of responses by U.S. producers indicating specific barriers to trade in major countries as encountered

Barriers	Australia	China	Taiwan	India	Japan	Republic of Korea	Singapore	Other Far Eastern countries	Argentina	Brazil
Quantitative restrictions and similar specific limitations:										
Licensing requirements	1	3	2	2	3	5	0	1	0	3
Quotas	0	0	0	0	2	0	0	0	0	1
Embargoes	1	1	1	1	1	1	0	0	0	1
Export restraints	0	0	0	0	1	1	0	1	0	0
Exchange and other monetary or financial controls	1	3	3	4	2	3	1	3	6	7
Minimum/maximum price regulations	0	0	0	0	0	0	0	0	0	1
Local content and mixing requirements	3	1	3	1	2	5	0	2	2	3
Restrictive business practices	0	0	0	0	4	0	0	0	0	1
Discriminatory bilateral agreements	0	0	0	0	0	0	0	0	0	0
Discriminatory sourcing	1	1	1	1	3	1	1	1	1	1
Other	0	0	0	0	0	0	0	0	1	0
Nontariff charges on imports:										
"Border" taxes	0	0	0	0	0	0	0	1	0	0
Port and statistical taxes, etc	0	0	0	0	0	0	0	0	0	0
Discriminatory excise taxes, government-controlled insurance, film taxes, use taxes, and commodity taxes	0	0	0	0	1	0	0	0	0	0
Nondiscriminatory sales taxes	1	1	1	0	1	1	0	1	0	0
Discriminatory sales taxes	0	0	1	0	0	0	0	0	0	0
Prior import deposits	0	0	0	0	0	0	0	0	1	2
Variable levies	1	0	0	0	0	0	0	0	0	0
Consular fees	0	0	0	0	0	0	0	1	2	0
Stamp taxes	0	0	0	0	0	0	0	2	1	0
Other taxes and fee	0	0	0	0	0	0	0	1	0	0
Government participation in trade:										
Subsidies and other aids	0	0	1	0	5	1	0	1	0	0
State trading, government monopolies, and exclusives franchises	0	0	0	0	3	0	0	0	0	0
Laws and practices with discourage imports	0	2	2	2	8	2	0	1	1	2

Table F-1.--Number of responses by U.S. producers indicating specific barriers to trade in major countries as encountered--Continued

Barriers	Australia	China	Taiwan	India	Japan	Republic of Korea	Singapore	Other Far Eastern countries	Argentina	Brazil
Government participation in trade--Continued:										
General government policy problems	1	1	1	1	5	3	0	1	1	1
Government procurement	1	1	1	1	3	1	0	2	0	0
Standards:										
Health and safety standards	0	0	0	0	0	0	0	0	0	0
Product content requirements	1	1	2	1	2	4	0	1	1	0
Industrial standards	0	0	0	0	0	0	0	0	0	1
Marking requirements	0	0	0	1	0	0	0	0	0	0
Packaging requirements	0	0	0	1	0	0	0	0	0	0
Trademark problems	0	0	1	1	0	0	0	0	0	0
Customs procedures and administrative practices:										
Customs valuation	0	0	0	0	1	0	0	0	0	0
Consular formalities	0	0	0	0	1	0	0	1	1	0
Documentation requirements	0	0	0	0	1	1	0	0	1	0
Administrative difficulties	0	1	0	1	2	2	0	0	0	1
Merchandise classification problems	0	0	0	0	0	0	0	0	0	0
Regulations on samples, returned goods, and reexports	0	2	0	1	1	2	0	0	1	0
Countervailing duties	0	0	0	0	0	0	0	0	0	0
Emergency action	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0
Foreign Corrupt Practices Act	0	0	0	0	1	0	0	1	0	0
Other (specify)	1	0	0	0	0	0	0	0	0	0

Table F-1.--Number of responses by U.S. producers indicating specific barriers to trade in major countries as encountered--Continued

Barriers	Other Central and South American countries	Austria	Belgium	West Germany	France	Italy	Netherlands	Portugal	Spain	United Kingdom
Quantitative restrictions and similar specific limitations:										
Licensing requirements	6	1	0	2	1	1	0	1	2	0
Quotas	0	0	0	0	0	0	0	0	0	0
Embargoes	2	0	0	0	0	0	0	0	0	0
Export restraints	0	0	0	0	0	0	0	0	0	0
Exchange and other monetary or financial controls	7	0	0	0	1	1	0	0	0	0
Minimum/maximum price regulations	0	0	0	0	1	0	0	0	0	0
Local content and mixing requirements	2	0	0	2	1	0	0	0	1	3
Restrictive business practices	0	1	1	1	1	1	1	1	1	2
Discriminatory bilateral agreements	0	0	0	0	0	0	0	0	0	0
Discriminatory sourcing	1	1	1	2	2	2	2	1	1	1
Other	1	0	0	0	0	0	0	0	0	0
Nontariff charges on imports:										
"Border" taxes	0	0	0	0	0	0	0	0	0	0
Port and statistical taxes, etc	0	0	0	0	0	0	0	0	0	0
Discriminatory excise taxes, government-controlled insurance, film taxes, use taxes, and commodity taxes	1	0	0	0	0	0	0	0	0	0
Nondiscriminatory sales taxes	0	0	0	0	0	0	0	0	0	0
Discriminatory sales taxes	0	0	0	0	0	0	0	0	0	0
Prior import deposits	3	0	0	0	0	0	0	0	0	0
Variable levies	0	0	1	1	1	1	1	0	0	1
Consular fees	2	0	0	0	0	0	0	0	0	0
Stamp taxes	2	0	0	0	0	0	0	1	0	0
Other taxes and fee	0	0	0	0	0	0	0	0	0	0
Government participation in trade:										
Subsidies and other aids	1	1	1	1	3	1	1	1	1	2
State trading, government monopolies, and exclusives franchises	0	0	0	0	0	0	0	0	0	0
Laws and practices with discourage imports	1	1	0	1	2	0	1	1	1	1

Table F-1.--Number of responses by U.S. producers indicating specific barriers to trade in major countries as encountered--Continued

Barriers	Other Central and South American countries	Austria	Belgium	West Germany	France	Italy	Netherlands	Portugal	Spain	United Kingdom
Government participation in trade--Continued:										
General government policy problems	2	1	1	1	1	1	1	1	1	1
Government procurement	0	0	0	0	1	0	0	0	0	1
Standards:										
Health and safety standards	0	0	0	2	0	0	0	0	0	0
Product content requirements	1	0	0	0	0	0	0	0	0	1
Industrial standards	0	0	0	2	0	0	0	0	0	0
Marking requirements	0	0	0	0	0	0	0	0	0	0
Packaging requirements	0	0	0	0	0	0	0	0	0	0
Trademark problems	0	0	0	0	0	0	0	0	0	0
Customs procedures and administrative practices:										
Customs valuation	0	0	0	0	0	0	0	0	0	0
Consular formalities	3	0	0	0	0	0	0	0	0	0
Documentation requirements	1	0	0	0	1	0	0	0	0	0
Administrative difficulties	0	0	0	0	0	1	0	0	0	0
Merchandise classification problems	0	0	0	0	0	0	0	0	0	0
Regulations on samples, returned goods, and reexports	2	0	0	0	0	1	0	0	0	0
Countervailing duties	0	0	0	0	0	0	0	0	0	0
Emergency action	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0
Foreign Corrupt Practices Act	1	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0

Table F-1.--Number of responses by U.S. producers indicating specific barriers to trade in major countries as encountered--Continued

Barriers	Switzerland	Sweden	Denmark	Other Western European countries	East Germany	Romania	Poland	Czechoslavia	Yugoslavia	Hungary
Quantitative restrictions and similar specific limitations:										
Licensing requirements	1	1	0	0	0	0	0	0	0	0
Quotas	0	0	0	0	0	0	0	0	0	0
Embargoes	0	0	0	0	0	0	0	0	0	0
Export restraints	0	0	0	0	0	0	0	0	0	0
Exchange and other monetary or financial controls	0	0	0	1	0	0	0	0	0	0
Minimum/maximum price regulations	0	0	0	0	0	0	0	0	0	0
Local content and mixing requirements	0	0	0	0	1	0	0	0	0	0
Restrictive business practices	1	1	0	0	0	0	0	0	0	0
Discriminatory bilateral agreements	0	0	0	0	0	0	0	0	0	0
Discriminatory sourcing	1	1	1	1	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0
Nontariff charges on imports:										
"Border" taxes	0	0	0	0	0	0	0	0	0	0
Port and statistical taxes, etc	0	0	0	0	0	0	0	0	0	0
Discriminatory excise taxes, government-controlled insurance, film taxes, use taxes, and commodity taxes	0	0	0	0	0	0	0	0	0	0
Nondiscriminatory sales taxes	0	0	0	0	0	0	0	0	0	0
Discriminatory sales taxes	0	0	0	0	0	0	0	0	0	0
Prior import deposits	0	0	0	1	0	0	0	0	0	0
Variable levies	0	0	0	1	0	0	0	0	0	0
Consular fees	0	0	0	0	0	0	0	0	0	0
Stamp taxes	0	0	0	1	0	0	0	0	0	0
Other taxes and fee	0	0	0	0	0	0	0	0	0	0
Government participation in trade:										
Subsidies and other aids	1	2	1	1	0	0	0	0	0	0
State trading, government monopolies, and exclusives franchises	0	0	0	0	0	0	0	0	0	0
Laws and practices with discourage imports	1	0	0	0	0	0	0	0	0	0

Table F-1.--Number of responses by U.S. producers indicating specific barriers to trade in major countries as encountered--Continued

Barriers	Switzer-land	Sweden	Denmark	Other Western European countries	East Germany	Romania	Poland	Czecho-slavia	Yugoslavia	Hungary
Government participation in trade--Continued:										
General government policy problems	1	1	1	0	0	0	0	0	0	0
Government procurement	0	1	0	0	0	0	0	0	0	0
Standards:										
Health and safety standards	0	0	0	0	0	0	0	0	0	0
Product content requirements	0	0	0	0	0	0	0	0	0	0
Industrial standards	0	0	0	0	0	0	0	0	0	0
Marking requirements	0	0	0	0	0	0	0	0	0	0
Packaging requirements	0	0	0	0	0	0	0	0	0	0
Trademark problems	0	0	0	0	0	0	0	0	0	0
Customs procedures and administrative practices:										
Customs valuation	0	0	0	0	0	0	0	0	0	0
Consular formalities	0	0	0	1	0	0	0	0	0	0
Documentation requirements	0	0	0	0	0	0	0	0	0	0
Administrative difficulties	0	0	0	0	0	0	0	0	0	0
Merchandise classification problems	0	0	0	0	0	0	0	0	0	0
Regulations on samples, returned goods, and reexports	0	0	0	0	0	0	0	0	0	0
Countervailing duties	0	0	0	0	0	0	0	0	0	0
Emergency action	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0
Foreign Corrupt Practices Act	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0

Table F-1.--Number of responses by U.S. producers indicating specific barriers to trade in major countries as encountered--Continued

Barriers	Bulgaria	Other Eastern European countries	Republic of South Africa	Other African countries	Canada	Mexico	Soviet Union	Israel
Quantitative restrictions and similar specific limitations:								
Licensing requirements	0	0	1	0	2	4	2	0
Quotas	0	0	0	0	0	1	0	0
Embargoes	0	0	0	2	0	0	1	0
Export restraints	0	0	0	0	0	1	2	0
Exchange and other monetary or financial controls	0	0	1	4	0	6	0	0
Minimum/maximum price regulations	0	0	0	0	1	2	0	0
Local content and mixing requirements	0	0	1	1	4	6	0	0
Restrictive business practices	0	0	0	1	1	1	0	0
Discriminatory bilateral agreements	0	0	0	0	1	0	0	0
Discriminatory sourcing	0	0	1	2	2	1	1	1
Other	0	0	0	0	1	0	0	0
Nontariff charges on imports:								
"Border" taxes	0	0	0	1	2	1	0	0
Port and statistical taxes, etc	0	0	0	1	0	0	0	0
Discriminatory excise taxes, government-controlled insurance, film taxes, use taxes, and commodity taxes	0	0	0	1	0	0	0	0
Nondiscriminatory sales taxes	0	0	0	1	0	0	0	0
Discriminatory sales taxes	0	0	0	0	1	0	0	0
Prior import deposits	0	0	0	0	0	0	0	0
Variable levies	0	0	0	0	0	1	0	0
Consular fees	0	0	0	1	0	0	0	0
Stamp taxes	0	0	0	0	0	0	0	0
Other taxes and fee	0	0	0	1	0	0	0	0
Government participation in trade:								
Subsidies and other aids	0	0	0	0	0	1	0	0
State trading, government monopolies, and exclusives franchises	0	0	0	0	0	0	0	0
Laws and practices with discourage imports	0	0	1	1	2	2	0	0

Table F-1.--Number of responses by U.S. producers indicating specific barriers to trade in major countries as encountered--Continued

Barriers	Bulgaria	Other Eastern European countries	Republic of South Africa	Other African countries	Canada	Mexico	Soviet Union	Israel
Government participation in trade--Continued:								
General government policy problems	0	0	0	2	0	1	1	0
Government procurement	1	0	0	0	0	0	0	
Standards:								
Health and safety standards	0	0	0	0	1	0	0	0
Product content requirements	0	0	0	1	2	2	0	0
Industrial standards	0	0	0	0	1	1	0	0
Marking requirements	0	0	0	0	0	0	0	0
Packaging requirements	0	0	0	0	0	0	0	0
Trademark problems	0	0	0	0	0	0	0	0
Customs procedures and administrative practices:								
Customs valuation	0	0	0	0	0	0	0	0
Consular formalities	0	0	0	2	0	0	0	0
Documentation requirements	0	0	0	2	0	1	3	0
Administrative difficulties	0	0	0	0	0	0	2	0
Merchandise classification problems	0	0	0	0	0	0	1	0
Regulations on samples, returned goods, and reexports	0	0	0	0	0	0	2	0
Countervailing duties	0	0	0	0	2	0	0	0
Emergency action	0	0	0	0	0	0	2	0
Other	0	0	0	0	0	0	1	0
Foreign Corrupt Practices Act	0	0	0	0	1	0	2	0
Other	0	0	0	0	1	0	0	0

APPENDIX G

SIGNIFICANT LEGISLATIVE, JUDICIAL, AND REGULATORY ACTIONS AFFECTING THE TELECOMMUNICATIONS INDUSTRY

Significant Legislative, Judicial, and Regulatory Actions Affecting the Telecommunications Industry

The current competitive environment has been shaped by numerous judicial, legislative, and regulatory actions. It should also be recognized that these decisions and likely future decisions ultimately will probably affect the equipment-producing industry as well as the services industry. In most cases the effects of recent actions are subtle and are not readily discernable; however, certain of these actions are generally recognized as landmarks which most directly and immediately have affected the telecommunications industry.

The Willis-Graham Act, 1921

Within 10 years after the first telephone patents filed by the inventor had expired (1894), some 6,000 phone companies had come into existence. In many areas, several phone companies offered the same service. Often these companies had no direct connection with the other's equipment. A customer seeking wide coverage (police, fire, and hospitals) required different telephones provided by several companies.

In the early 1900's, individual States began to regulate telephone companies as utilities. A chief issue in such cases was the inefficiency brought about by the uncoordinated, technically dissimilar, and duplicate services. By 1920, many States had substituted public regulation for private competition in the telephone industry.

In 1921, the Willis-Graham Act endorsed, on the national level, a policy of consolidation of telephone companies and the establishment of legally franchised monopolies within a given service area. The act provided exemption from antitrust laws for consolidations approved by the Interstate Commerce Commission (ICC). 1/ It provided the basis for a national telephone network using common engineering standards, system signaling, noise and transmission standards, numbering, and maintenance standards. 2/

The Communications Act of 1934

The U.S. House of Representatives directed an in-depth investigation of the electric power, natural gas, and the telephone industries in 1932. By this year, A.T. & T. had emerged as the largest of the franchised telephone utilities. For the telephone industry, the outcome of the investigation was the Communications Act of 1934. This law created the Federal Communications Commission (FCC) to regulate "in the public interest" all forms of telephone,

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1/ In 1910, the Mann-Elkin Act had made the ICC responsible for regulation of the telephone and telegraph industry.

During World War I, the Postmaster General took over operation of the telephone industry. This experience also contributed to the enactment of the Willis-Graham Act.

2/ Not all service areas were consolidated rapidly. It is reported that as late as 1939 there were communities served by two telephone companies.

telegraph, and wireless communications. 1/ There was little other guidance provided to the FCC in the law. The recommendation of the chief congressional investigator during the hearings was that the structure of the industry be maintained. A prime reason given was the requirement for universal interconnection between all telephones.

Department of Justice and A.T. & T. consent decree of 1956

As the result of an antitrust suit filed by the Department of Justice in 1949, A.T. & T. entered into a consent decree in 1956. Sections IV and X of the consent decree most directly affected the telecommunications equipment industry.

Section IV essentially prohibited A.T. & T. and Western Electric from manufacturing any products not used by the Bell Telephone System in furnishing communications services. Section X required A.T. & T. to grant licenses for all patents including prior and future patents. Prior patents were to be licensed royalty free, and later patents, at reasonable rates. However, the terms of the consent decree did permit A.T. & T. to require cross-licensing of an applicant's patents.

As an example of the effects of the consent decree, the transistor, upon which the entire semiconductor industry is based, was invented in, and patented by, the Bell Telephone Laboratories in 1948. U.S. shipments of seniconductors by U.S. producers in 1983 exceeded $11 billion.

The FCC Hush-A-Phone decision, 1956

Prior to 1956, complete end-to-end service was supplied by operating telephone companies, in that all equipment was owned by the telephone companies. Alien (not provided by the telephone company) attachments to telephone instruments were prohibited until the Hush-A-Phone case, which was the first decision which permitted the attachment of an alien device to telephone equipment. The Hush-A-Phone was simply a cup like device which, when placed on the mouthpiece of a telephone set, funneled the speaker's voice into the transmitter. The device was designed for use in noisy environments to decrease the amount of outside noise entering the mouthpiece.

The FCC ruled against Hush-A-Phone but was itself overruled in the Federal courts. It is considered by most in the trade to be a precursor to the Carterfone decision.

1/ The ICC's authority over telephone and telegraph commerce was transferred to the FCC. The Federal Radio Commission, established in 1927, was also incorporated into the new FCC.

The FCC decision on 890 mhz, 1959 1/

Microwave 2/ frequencies above 890 mhz in the then upper regions of the radio spectrum became technically and economically useful for the transmission of all types of information in the late 1940's, following development during World War II. Prior to 1959, these frequencies were allocated, essentially, to common carriers. 3/ By 1959, more than one-fifth of the long-distance circuit mileage was implemented by microwave radio. In 1959, the FCC announced a policy of general authorization for use of frequencies above 890 mhz by private users.

The Communications Satellite Act of 1962

In 1962, the Congress established a private regulated corporation to be owned by both common carriers and the public and to be an international satellite carrier of domestic carriers. The Communications Satellite Corp. (COMSAT) is a wholesaler of international communications circuits, is the U.S. member of the International Telecommunications Satellite Organization (INTELSAT); 4/ and is currently the only authorized U.S. international satellite common carrier. The 1962 act provided particularly that the intent of Congress was maximum competition for the provision of equipment to the corporation. A number of significant changes affecting COMSAT and other satellite carriers are currently under consideration by the FCC.

The FCC Carterfone decision, 1968

The Carter Electric Co. filed an antitrust suit against A.T. & T. in 1966. At issue was the connection of the Carterfone device to the telephone instrument. The device was an acoustic coupler for connecting radio transceivers to the telephone instrument. The radio transceivers were part of a mobile radio system. However, the finding covered the connection of a broader range of equipment than just the Carterfone devices to the telephone system. The antitrust suit was dismissed, with the court ruling that the FCC had primary jurisdiction to decide if the Carterfone equipment could be connected to the telephone system. At this time, the FCC was investigating the same issue in several different proceedings. In 1968, the FCC ruled in favor of Carterfone.

1/ Effective in 1960 having been delayed by reconsideration.

2/ The term "microwave" is an imprecisely defined term generally meaning radio waves having a wavelength of less than 30 cm (i.e., having a frequency of 1,000 mhz or greater).

3/ Under certain conditions where no common carrier relay or cable connections were available, television broadcasters were granted licenses. Private microwave systems were also authorized principally for use by utilities such as pipeline and electric railroad companies.

4/ COMSAT is also the official U.S. member of the International Maritime Satellite Organization, whose purpose is to provide improved ship-to-shore and ship-to-ship communications worldwide.

The telephone companies defended their prohibition on the connection of customer-provided equipment on the basis of harm to the network and potential harm to the customer. The FCC decided that the connection of harmless devices and potentially harmful devices must be treated separately. Sound coupling devices, such as Carterfone's, were ruled, essentially, harmless. 1/ The issue of direct electrical connection to the telephone lines was not completely resolved.

The specialized common carrier decision, 1971

In 1963, Microwave Communication, Inc. (MCI), applied to the FCC for authorization to operate as a common carrier between St. Louis and Chicago and to offer data transmission, facsimile, and voice, as well as other services packaged to meet specialized needs. The service would be in competition with A.T. & T.'s tariffed offerings. In 1969, MCI's application was finally approved. Following the approval of MCI's construction application, many other parties applied for similar authorizations. Rather than ruling on each application on a case-by-case basis, the FCC initiated an inquiry into the broad issue of allowing competition from specialized common carriers. At the time, the opposition to the creation of the new service stated that approval would cause a great disruption in the communications system, higher rates to customers, and duplication of facilities. The FCC, nonetheless, found that the new entry of specialized common carriers would serve the public interest. This decision created the current industry which supplies cut-rate long-distance phone service between selected cities in competition with established common carriers.

The FCC first order registration program, 1974

In 1972, the FCC issued a Notice of Inquiry and Proposed Rulemaking which became Docket 19528. This proceeding began a broad investigation into the technical impact of direct connection of customer-provided equipment with the public-switched network.

The First Order established a registration program for terminal equipment. When a manufacturer submitted equipment to the FCC which met standards necessary to protect the telephone system from harm, a registration number was to be issued. Registered equipment could then be connected directly to the telephone system. However, this First Order did not cover telephone sets, key sets, and PBX equipment. This equipment required further FCC investigation.

The FCC second order registration program, 1977

In 1976, the FCC issued a Second Order which included telephone sets, key sets, and PBX's in its registration program. This Order was stayed in the Federal courts until October 1977, when it was upheld. Even then, PBX's were

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1/ After 1968, the telephone companies allowed direct connection with telephone lines through equipment called "protective couplers." These couplers were rented to the customer by the telephone company.

not accepted for registration because of the technical problems in designing a standard interface and other specifications. These problems, however, were resolved in early 1978, and PBX's are now accepted for registration.

The FCC computer II inquiry, 1980

In an earlier inquiry (Computer I) filed in 1966, the FCC attempted to distinguish between computation and communication. A subsequent inquiry, Computer II, in 1980, continued the deregulatory trends begun with Hush-A-Phone. The FCC decided that customer premises equipment (CPE) should not be regulated as common carrier offerings, and A.T. & T. was allowed to sell such equipment through a fully separate subsidiary. A.T. & T. did establish such a subsidiary prior to the divestiture and continues to use the subsidiary for marketing of CPE post divestiture.

Department of Justice and AT&T modification of final judgement (AT&T divestiture), 1982

The most recent U.S. Government antitrust action was instituted in late 1974 against the American Telephone & Telegraph Co. (A.T. & T.) and has resulted in a modification of (in fact, the complete replacement of) the original 1956 judgement (known as the 1956 consent decree). The Modification of Final Judgement was entered on August 24, 1982, and resulted in the divestiture by A.T. & T. of its operating companies on January 1, 1984. The major provisions of the judgement which effect the industry which manufactures telecommunications apparatus are as follows:

a. The local Bell Operating Companies (BOC's) have been divested by A.T. & T. and organized into seven regional holding companies. These companies are to provide the basic connection from the customer to either the local network (exchange telecommunications) or to a long-distance network (exchange access). The BOC's must offer any available long-distance services (A.T. & T. or other common carriers) to the customers. The local companies are free to purchase equipment from any source and, in fact, must cancel the open-ended supply agreements with Western Electric. The BOC's are prohibited from manufacturing telecommunications apparatus and providing long-distance services.

b. A.T. & T. now consists principally of (1) the Long Lines Department, which provides long-distance service; (2) the Bell Telephone Laboratories, which provides research and development services; (3) Western Electric Co. which manufactures telecommunications apparatus; and (4) several newly formed marketing organizations which provide for national and overseas sales and leasing. A.T. & T. is free to enter any line of business except electronic publishing.

From the point of view of the industry which manufactures telecommunications apparatus, the two most significant changes brought by the judgement are the following. First, A.T. & T., principally Western Electric, may now engage in any line of business and sell products in any market. Second, the divested operating companies may purchase equipment from the open market without reservation.

APPENDIX H

STATISTICAL TABLES

Table H-1.--Consumption of total telecommunications equipment, by countries, U.S. consumption as a share of world consumption, and U.S. exports as a share of foreign consumption, 1972-83

Item	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
West Germany												
million dollars	1,760.0	2,280.0	2,550.0	2,650.0	2,662.5	3,390.0	4,990.5	5,324.9	5,681.6	6,062.3	6,468.5	6,901.9
Japan----------do	1,548.0	2,148.6	1,954.7	1,748.4	2,240.5	2,832.0	3,483.6	3,401.7	3,774.9	4,230.0	4,533.0	4,988.4
France----------do	952.1	1,445.3	1,734.9	2,013.0	2,066.5	2,140.0	2,234.0	2,360.0	2,467.0	2,734.2	2,956.5	3,120.0
United Kingdom---do	958.0	1,184.1	1,249.2	1,048.2	1,156.6	1,281.5	1,442.3	1,948.8	2,719.5	2,671.0	2,829.5	3,019.2
Italy----------do	474.6	542.9	603.9	651.5	762.5	871.0	1,103.0	1,343.0	1,446.8	1,378.5	1,403.0	1,471.9
Canada----------do	506.0	530.0	613.0	694.0	776.6	882.8	920.5	907.9	955.7	1,026.2	1,113.4	1,224.4
Netherlands------do	180.0	217.6	235.0	248.2	292.5	377.0	455.9	539.2	619.7	519.6	528.5	541.8
Sweden----------do	133.5	158.6	154.8	161.8	183.8	205.4	227.2	265.5	294.2	297.5	308.9	321.9
Other----------do	4,239.3	5,671.4	6,063.6	6,143.4	6,763.0	7,986.5	9,904.7	10,727.3	11,972.9	12,612.8	13,427.9	14,392.3
Total foreign												
million dollars	10,751.5	14,178.5	15,159.0	15,358.5	16,907.5	19,966.2	24,761.7	26,818.4	29,932.4	31,532.1	33,568.7	35,980.7
United States----do	5,599.1	6,353.2	6,791.1	6,168.2	6,868.4	9,050.5	10,008.9	12,375.4	14,351.2	16,069.8	15,855.6	18,482.4
Total world												
million dollars	16,350.6	20,531.7	21,950.1	21,526.7	23,775.9	29,016.7	34,770.6	39,193.8	44,283.6	47,601.9	49,424.3	54,463.1
U.S. consumption as a share of world consumption												
percent	34.2	30.9	30.9	28.7	28.9	31.2	28.8	31.6	32.4	33.8	32.1	33.9
U.S. exports as a share of foreign consumption												
percent	1.3	1.2	1.8	2.4	2.6	2.8	3.0	3.2	3.2	3.6	3.9	3.7

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce.

Note.--Because of rounding, figures may not add to the totals shown.

Table H-2.--Consumption of transmission equipment, by countries, U.S. consumption as a share of world consumption, and U.S. exports as a share of foreign consumption, 1972-83

Item	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
West Germany												
million dollars--	522.5	677.5	740.0	752.5	765.0	980.0	1,505.0	1,605.8	1,713.4	1,828.2	1,950.7	2,081.4
Japan----------do----	360.9	468.8	418.5	354.1	550.0	720.0	963.3	785.9	871.9	945.6	975.0	1,087.5
France----------do----	144.7	222.7	299.2	359.0	362.0	365.0	364.0	367.0	363.0	369.0	386.1	400.0
United Kingdom----do----	65.0	69.0	60.0	55.0	70.6	92.0	106.5	145.1	156.2	139.0	142.5	157.0
Italy----------do----	65.0	72.0	75.8	80.0	92.5	110.5	151.6	210.7	242.9	198.7	200.0	202.4
Canada----------do----	103.0	107.0	122.0	137.0	147.5	149.6	150.1	150.7	149.2	195.6	190.4	212.3
Netherlands-------do----	19.2	25.0	20.0	21.0	26.5	28.0	34.0	37.6	40.1	31.7	32.0	32.6
Sweden----------do----	19.8	23.0	18.8	19.8	25.2	27.6	31.1	38.2	41.0	33.5	33.9	34.0
Other----------do----	870.0	1,110.1	1,169.5	1,185.6	1,359.7	1,648.3	2,203.4	2,226.9	2,385.3	2,480.7	2,607.4	2,804.7
Total foreign												
million dollars--	2,170.0	2,775.0	2,923.6	2,964.0	3,399.0	4,121.0	5,509.0	5,568.0	5,963.0	6,202.0	6,518.0	7,012.0
United States-----do----	921.0	1,011.8	1,104.2	1,096.7	1,271.2	1,629.8	1,832.5	2,247.9	3,021.3	4,035.8	4,535.7	5,153.6
Total world												
million dollars--	3,091.0	3,786.8	4,207.8	4,060.7	4,670.2	5,750.8	7,341.5	7,815.9	8,984.3	10,237.8	11,053.7	12,165.6
U.S. consumption as a share of world consumption--percent--	29.8	26.7	27.4	27.0	27.2	28.3	25.0	28.8	33.6	39.4	41.0	42.4
U.S. exports as a share of foreign consumption--percent--	.6	.7	1.0	1.3	1.6	1.5	1.3	1.6	1.8	2.0	2.1	2.1

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce.

Note.--Because of rounding, figures may not add to the totals shown.

Table H-3.--Consumption of switching equipment by countries, U.S. consumption as a share of world consumption, and U.S. exports as a share of foreign consumption, 1972-83

Item	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
West Germany												
million dollars	400.0	525.0	535.0	520.0	510.5	720.0	995.5	1,062.2	1,133.4	1,209.3	1,290.3	1,376.8
Japan----------do----	348.6	464.2	390.2	379.4	420.0	527.0	620.0	697.6	759.6	874.8	943.0	1,049.8
France----------do----	341.4	499.8	555.6	611.0	650.0	685.0	750.0	825.0	965.0	1,217.0	1,288.3	1,320.0
United Kingdom-do----	508.0	656.2	678.4	480.8	501.0	509.5	514.0	733.5	1,092.2	1,111.7	1,190.0	1,256.2
Italy----------do----	35.0	50.0	75.0	100.0	200.5	305.0	479.0	554.8	581.8	587.2	600.0	656.1
Canada----------do----	125.0	135.0	176.0	210.0	240.7	310.0	335.0	325.0	361.0	373.0	402.2	435.5
Netherlands----do----	50.0	63.0	75.0	68.0	80.0	102.0	145.0	198.0	205.0	210.5	213.0	217.6
Swedon----------do----	43.0	45.0	49.0	51.5	55.6	60.2	63.8	68.6	72.0	78.4	83.0	86.9
Other----------do----	1,234.0	1,625.5	1,689.5	1,614.8	1,772.3	2,145.8	2,601.6	2,976.5	3,446.6	3,774.6	4,006.5	4,266.0
Total foreign												
million dollars	3,085.0	4,063.7	4,223.7	4,034.5	4,430.6	5,364.5	6,504.0	7,441.1	8,616.5	9,436.5	10,016.4	10,664.9
United States--do----	1,279.4	1,419.3	1,636.8	1,585.3	1,731.2	2,361.2	2,456.5	2,855.1	3,134.8	2,964.5	2,703.4	3,086.3
Total world												
million dollars	4,364.4	5,483.0	5,860.5	5,619.8	6,161.8	7,725.7	8,960.5	10,296.2	11,751.3	12,401.0	12,719.8	13,751.2
U.S. consumption as a share of world consumption												
percent	29.3	25.9	27.9	28.2	28.1	30.6	27.4	27.7	26.7	23.9	21.3	22.4
U.S. exports as a share of foreign consumption												
percent	0.6	0.6	0.9	1.5	1.1	1.9	3.1	3.1	3.5	4.1	5.2	5.0

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce.

Note.--Because of rounding, figures may not add to the totals shown.

Table H-4.--Consumption of customer premises equipment, by countries, U.S. consumption as a share of world consumption, and U.S. exports as a share of foreign consumption, 1972-83

Item	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
West Germany												
million dollars--	315.0	400.0	535.0	625.0	622.0	710.0	985.0	1,051.0	1,121.4	1,196.6	1,276.7	1,362.3
Japan----------do----	477.6	746.9	727.6	640.8	750.5	875.0	1,079.8	1,248.7	1,400.7	1,604.0	1,750.0	1,924.8
France----------do----	321.4	500.1	581.0	684.0	692.5	725.0	756.0	801.0	776.0	779.2	896.0	1,000.0
United Kingdom----do----	320.0	390.9	450.8	457.4	495.0	530.0	584.7	775.7	1,115.6	1,111.0	1,175.0	1,255.5
Italy----------do----	309.6	348.9	377.3	391.5	380.0	360.0	358.0	418.6	438.9	443.0	449.0	452.9
Canada----------do----	175.0	181.0	193.0	210.0	240.7	273.7	285.3	281.5	296.3	302.0	330.3	364.2
Netherlands-------do----	65.0	78.0	89.0	105.0	135.0	180.0	198.0	210.0	254.3	174.4	180.0	185.1
Sweden----------do----	46.2	58.0	56.0	57.5	65.0	74.0	83.6	98.9	117.8	133.3	140.0	149.9
Other----------do----	1,353.2	1,802.2	2,006.5	2,113.8	2,254.3	1,485.1	2,886.6	3,256.6	3,681.0	3,828.6	4,131.0	4,463.4
Total foreign												
million dollars--	3,383.0	4,506.0	5,016.0	5,285.0	5,635.0	5,212.8	7,217.0	8,142.0	9,202.0	9,572.0	10,328.0	11,158.0
United States-----do----	2,181.9	2,472.5	2,633.0	2,488.9	2,606.2	3,558.4	4,227.1	5,331.6	6,220.9	7,102.7	6,944.2	8,479.4
Total world												
million dollars--	5,564.9	6,978.5	7,649.2	7,773.9	8,241.2	8,771.2	11,494.1	13,473.6	15,422.9	16,674.7	17,272.2	19,637.4
U.S. consumption as a share of world consumption-----percent--	39.2	35.4	34.4	32.0	31.6	40.6	37.2	39.6	40.3	42.6	40.2	43.2
U.S. exports as a share of foreign consumption---------percent--	1.9	1.7	1.5	3.3	4.1	4.3	4.4	4.7	4.9	5.1	5.0	4.4

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce.

Note.--Because of rounding, figures may not add to the totals shown.

Table H-5.--Consumption of transmission equipment by countries, U.S. consumption as a share of world consumption, and U.S. exports as a share of foreign consumption, 1972-83

Item	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
West Germany												
million dollars--	522.5	677.5	740.0	752.5	765.0	980.0	1,505.0	1,605.8	1,713.4	1,828.2	1,950.7	2,081.4
Japan----------do----	360.9	468.8	418.5	354.1	550.0	720.0	963.3	785.9	871.9	945.6	975.0	1,087.5
France---------do----	144.7	222.7	299.2	359.0	362.0	365.0	364.0	367.0	363.0	369.0	386.1	400.0
United Kingdom-do----	65.0	69.0	60.0	55.0	70.6	92.0	106.5	145.1	156.2	139.0	142.5	157.0
Italy----------do----	65.0	72.0	75.8	80.0	92.5	110.5	151.6	210.7	242.9	198.7	200.0	202.4
Canada---------do----	103.0	107.0	122.0	137.0	147.5	149.6	150.1	150.7	149.2	195.6	190.4	212.3
Netherlands----do----	19.2	25.0	20.0	21.0	26.5	28.0	34.0	37.6	40.1	31.7	32.0	32.6
Sweden---------do----	19.8	23.0	18.8	19.8	25.2	27.6	31.1	38.2	41.0	33.5	33.9	34.0
Other----------do----	870.0	1,110.1	1,169.5	1,185.6	1,359.7	1,648.3	2,203.4	2,226.9	2,385.3	2,480.7	2,607.4	2,804.7
Total foreign												
million dollars--	2,170.0	2,775.0	2,923.6	2,964.0	3,399.0	4,121.0	5,509.0	5,568.0	5,963.0	6,202.0	6,518.0	7,012.0
United States--do----	3,932.2	4,279.7	4,976.1	5,018.1	5,445.9	6,613.1	7,663.9	9,194.9	11,139.4	12,449.0	12,618.8	14,183.7
Total world												
million dollars--	6,102.2	7,054.7	7,899.7	7,982.1	8,844.9	10,734.1	13,172.9	14,762.9	16,707.4	18,651.0	19,136.8	21,195.7
U.S. consumption as a share of world consumption												
percent--	64.4	60.7	63.0	62.9	61.6	61.6	58.2	62.3	66.7	66.7	65.9	66.9
U.S. exports as a share of foreign consumption												
percent--	.6	.7	1.0	1.3	1.6	1.5	1.3	1.6	1.8	2.0	2.1	2.1

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce.

Note.--Because of rounding, figures may not add to the totals shown.

Table H-6.--Telecommunications equipment and parts thereof: U.S. exports of domestic merchandise, by principal markets, 1979-83

(In thousands of dollars)

Market	1979	1980	1981	1982	1983
Republic of Korea	17,378	35,731	80,173	215,511	186,357
Canada	103,983	129,854	170,124	158,384	166,177
United Kingdom	57,656	77,580	80,400	140,800	114,163
Saudi Arabia	83,695	54,537	67,273	93,439	100,596
Egypt	11,102	15,955	8,950	15,623	71,172
Mexico	31,404	50,487	79,005	61,175	61,931
West Germany	40,300	55,210	49,617	46,505	52,453
Japan	24,012	27,941	31,788	32,567	42,705
Australia	15,978	24,091	37,785	37,101	34,038
France	25,193	33,445	34,274	33,044	32,777
Israel	14,177	19,738	20,439	24,934	32,057
Netherlands	12,881	19,190	17,687	19,908	28,528
Taiwan	36,198	61,108	55,049	28,556	23,776
Singapore	8,729	11,979	12,777	15,401	23,680
Hong Kong	13,108	18,477	28,066	22,917	21,367
All other	362,632	334,597	364,902	373,296	349,892
Total	858,426	969,918	1,138,308	1,319,161	1,341,671

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce (app. I).

Table H-7.--Transmission equipment and parts thereof: U.S. exports of domestic merchandise, by principal markets, 1979-83

(In thousands of dollars)

Market	1979	1980	1981	1982	1983
U King	7,234	9,460	8,914	10,540	19,277
Canada	7,708	10,824	11,067	11,809	18,041
Mexico	2,800	5,210	12,370	9,504	10,358
Fr Germ	4,740	5,542	6,332	6,421	7,370
S Arab	8,145	8,285	6,008	19,635	7,007
Nigeria	711	1,539	1,987	3,179	6,624
Brazil	3,894	2,231	2,987	3,965	5,223
France	1,124	2,258	3,822	3,893	3,788
Austral	1,663	1,761	2,387	1,797	3,605
Kor Rep	4,041	2,481	3,792	3,457	3,590
Rep Saf	1,300	2,016	3,131	4,743	3,444
Italy	1,858	1,832	2,517	3,162	3,425
Egypt	3,813	4,963	991	5,136	3,344
Japan	1,997	1,548	2,750	2,930	3,243
Nethlds	908	1,355	1,425	1,835	2,587
All other	36,295	37,472	53,164	47,580	47,175
Total	88,231	98,777	123,643	139,587	148,103

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce (app. I).

Table H-8.--Switching equipment: U.S. exports of domestic merchandise, by principal markets, 1979-83

(In thousands of dollars)

Market	1979	1980	1981	1982	1983
Kor Rep	4,034	14,929	55,819	176,455	148,692
S Arab	30,560	20,070	22,816	35,001	55,396
Canada	30,351	40,111	61,734	51,104	55,161
Egypt	3,299	4,087	2,932	3,493	29,961
U King	8,435	13,437	14,402	42,096	26,660
Israel	4,056	7,804	8,235	12,063	18,897
Mexico	10,055	16,695	31,134	21,385	17,418
Phil R	6,445	11,712	12,751	13,128	14,093
Austral	2,642	6,363	14,262	15,892	11,028
China t	17,013	40,181	27,668	12,724	10,587
Japan	3,094	3,442	4,359	3,645	9,271
Hg Kong	1,868	5,509	10,482	7,709	8,330
Singapr	2,358	3,033	3,526	5,377	8,011
Venez	9,307	9,362	9,052	10,092	7,324
Belgium	7,811	16,207	8,350	5,749	6,902
All other	91,115	94,922	98,025	108,012	106,180
Total	232,444	307,865	385,547	523,923	533,912

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce (app. I).

Table H-9.--Customer premise equipment and parts thereof: U.S. exports of domestic merchandise, by principal markets, 1979-83

(In thousands of dollars)

Market	1979	1980	1981	1982	1983
Canada	51,465	57,122	72,554	71,188	66,542
U King	33,986	45,858	46,168	72,953	52,927
Kor Rep	7,824	15,340	16,329	31,879	29,799
Fr Germ	25,733	36,010	30,657	26,698	27,545
S Arab	33,566	15,955	19,953	24,465	25,135
Japan	15,363	19,187	19,549	21,247	24,561
Nethlds	9,703	14,544	12,802	13,623	20,096
Mexico	12,441	17,604	25,920	21,558	19,360
France	17,828	23,819	23,181	21,795	19,038
Austral	9,596	13,462	16,833	16,074	16,359
Singapr	3,464	4,842	5,189	7,099	11,237
Hg Kong	9,527	10,414	14,751	12,021	10,714
Italy	9,374	12,839	11,914	10,203	9,858
Ireland	3,074	4,365	5,572	7,111	9,552
Egypt	2,201	3,716	2,988	3,396	8,428
All other	136,633	159,582	167,746	159,509	143,852
Total	381,777	454,659	492,106	520,821	495,003

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce (app. I).

Table H-10.--Cable, wire, and lightguide: U.S. exports of domestic merchandise, by principal markets, 1979-83

(In thousands of dollars)

Market	1979	1980	1981	1982	1983
Egypt	1,150	2,723	1,860	3,317	27,540
Canada	11,251	19,302	20,916	19,831	23,128
U King	5,904	7,240	8,791	13,249	21,167
Mexico	5,655	10,760	10,059	9,791	13,418
Fr Germ	4,415	5,641	6,250	6,319	11,235
S Arab	9,729	8,500	17,328	12,836	10,567
France	1,817	2,702	3,191	3,629	6,881
Japan	2,930	3,414	4,973	4,649	4,495
Nigeria	4,451	3,065	6,979	1,853	4,453
Israel	2,312	2,831	4,187	3,603	3,730
Kor Rep	278	2,115	811	1,770	2,917
Austral	1,695	2,270	3,329	2,529	2,815
Italy	1,646	1,793	1,763	2,519	2,706
Singapr	1,494	2,547	1,788	1,376	2,529
China t	3,571	2,219	11,542	1,987	1,792
All other	97,675	31,496	33,244	45,580	25,282
Total	155,974	108,617	137,012	134,838	164,653

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce (app. I).

Table H-11.--Telecommunications equipment and parts thereof: U.S. imports for consumption, by principal sources, 1979-83

(In thousands of dollars)

Source	1979	1980	1981	1982	1983
Japan	162,287	231,571	348,021	427,728	715,720
China t	14,519	37,869	66,850	133,851	377,360
Hg Kong	7,959	13,474	21,904	55,649	272,499
Canada	131,607	163,659	136,177	165,434	217,118
Kor Rep	13,044	11,380	18,148	52,387	169,919
Mexico	24,004	32,898	42,538	48,398	52,525
Singapr	2,425	4,709	9,450	18,706	42,347
Israel	9,014	8,868	14,543	23,345	38,676
France	3,481	5,892	3,477	8,141	17,329
U King	2,941	4,073	6,751	11,584	16,912
Sweden	5,660	7,523	5,417	8,256	15,169
Fr Germ	15,800	14,729	10,202	16,349	14,382
Malaysa	412	815	1,056	8,046	7,109
Switzld	2,237	2,174	2,800	4,902	5,702
Italy	1,767	2,304	2,701	3,662	4,396
All other	16,019	17,131	22,802	31,649	23,169
Total	413,179	559,071	712,836	1,018,088	1,990,334

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce (app. I).

Table H-12.--Transmission equipment and parts thereof: U.S. imports for consumption, by principal sources, 1979-83

(In thousands of dollars)

Source	1979	1980	1981	1982	1983
Japan	22,941	27,960	37,937	59,846	112,415
Canada	24,070	31,892	34,457	53,866	58,687
China t	3,469	9,560	5,293	8,295	48,618
Hg Kong	2,166	2,308	2,920	4,841	37,350
Israel	518	1,466	4,603	6,770	19,075
Mexico	7,378	5,054	4,411	6,744	8,286
Kor Rep	2,415	920	1,231	2,362	6,795
Sweden	595	842	1,492	3,883	6,399
France	307	2,160	924	2,736	6,119
U King	1,385	1,790	2,304	3,572	5,857
Singapr	618	552	613	5,590	5,798
Fr Germ	1,537	1,587	1,830	6,779	4,294
Malaysa	189	106	345	5,669	4,015
Nethlds	1,664	506	3,362	7,822	1,402
Switzld	299	131	383	691	954
All other	3,550	5,271	4,330	5,839	5,642
Total	73,100	92,103	106,433	185,305	331,708

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce (app. I).

Table H-13.--Switching equipment: U.S. imports for consumption, by principal sources, 1979-83

(In thousands of dollars)

Source	1979	1980	1981	1982	1983
Japan	7,195	10,020	7,183	8,792	14,544
Canada	12,435	14,758	6,106	5,191	9,781
Mexico	202	627	510	569	667
Sweden	609	784	220	297	560
Israel	1,209	963	679	1,182	455
China t	178	111	74	129	441
Hg Kong	1	21	4	90	259
Malaysa	1/	47	9	137	186
France	337	231	56	97	182
Fr Germ	129	489	132	102	115
U King	9	8	41	91	110
Kor Rep	39	8	33	26	81
Singapr	5	3	1	11	62
Ireland	1/	-	1/	2	59
Czecho	-	-	-	-	46
All other	89	89	55	45	62
Total	22,439	28,158	15,102	16,762	27,609

1/ Less than 500.

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of the official statistics of the U.S. Department of Commerce (app. I).

TableH-14.--Customer premise equipment and parts thereof: U.S. imports for consumption, by principal sources, 1979-83

(In thousands of dollars)

Source	1979	1980	1981	1982	1983
Japan	129,036	188,882	297,230	353,679	581,507
China t	9,800	26,397	58,016	120,709	320,017
Hg Kong	5,365	10,698	18,451	50,262	234,167
Kor Rep	10,373	10,237	15,829	48,954	162,519
Canada	93,998	113,934	93,087	103,678	144,833
Singapr	1,541	3,840	8,667	12,963	36,140
Mexico	9,743	13,521	18,019	22,175	22,375
Israel	7,263	6,425	9,240	15,340	19,072
France	2,567	3,224	2,265	4,868	10,799
U King	1,187	1,721	3,874	7,405	10,341
Fr Germ	13,177	11,040	6,800	7,642	8,512
Sweden	4,373	5,750	3,586	3,974	8,059
Switzld	1,764	1,807	2,154	3,920	4,449
Italy	1,446	1,730	2,149	2,454	3,631
Malaysa	208	318	277	1,665	2,602
All other	9,577	9,034	13,109	15,346	13,377
Total	301,416	408,556	552,752	775,034	1,582,400

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of official statistics of the U.S. Department of Commerce (app. I).

TableH-15.--Cable, wire, and lightguide: U.S. imports for consumption, by principal sources, 1979-83

(In thousands of dollars)

Source	1979	1980	1981	1982	1983
Mexico	6,680	13,696	19,598	18,910	21,197
China t	1,073	1,802	3,467	4,718	8,284
Japan	3,081	4,709	5,671	5,411	7,254
Canada	1,102	3,075	2,527	2,699	3,817
Fr Germ	854	1,614	1,440	1,825	1,461
Hg Kong	425	447	530	456	723
Haiti	225	637	638	608	656
U King	353	554	532	517	604
India	52	262	303	764	559
Kor Rep	218	216	1,055	1,044	524
Nethlds	151	388	285	827	437
Thailnd	-	1	-	34	358
Singapr	260	315	169	142	347
Malaysa	15	346	425	576	306
Switzld	147	225	241	275	300
All other	1,369	1,968	1,668	2,181	1,791
Total	16,004	30,254	38,549	40,986	48,617

Source: Estimated by the staff of the U.S. International Trade Commission on the basis of the official statistics of the U.S. Department of Commerce (app. I).

APPENDIX I

DISCUSSION OF THE RESPONSE TO THE COMMISSIONS QUESTIONNAIRE AND THE METHODOLOGY FOR STAFF ESTIMATES

The Commission staff mailed 367 questionnaires to collect data for the investigation. Questionnaires were sent to 121 producers, 121 importers, 25 purchasers, and 100 prospective purchasers. The questionnaires sent to the producers, importers, and purchasers were sent to those firms which the staff determined were the major firms and which accounted for the bulk of activity within each group. The questionnaire mailed to the prospective purchasers was sent to a stratified random sample of 50 of the largest 500 manufacturing firms and 50 of the largest 500 service firms. It was designed to give the staff information which would aid in estimating major firms potential for "by passing" the traditional telephone netork.

The Commission staff received 231 responses to its questionnaires. For the producers, 76 responses were received; 31 firms reported that they manufactured the products and provided data, and 45 firms reported that they did not manufacture the products under investigation. As a share of the staff's estimated value of shipments, the value of shipments reported by producers in their responses to the Commission's questionnaire was 88 percent in 1981, 94 percent in 1982, and 87 percent in 1983.

For the importers, 64 firms responded, 41 provided data on their imports, and 23 responded that they did not import telecommunications equipment. The importers that responded affirmatively to the questionnaire accounted for 19 percent of the staff's estimate of the value of imports in 1981, 21 percent in 1982, and 26 percent in 1983.

For the purchasers, the Commission received 21 responses, all of which were affirmative. Purchases by the respondents accounted for 70 percent of the staff's estimate of apparent consumption in 1981, 67 percent in 1982, and 47 percent in 1983.

For the prospective purchasers, the Commission received 70 responses, 64 contained data useful to the staff, and 6 were either negative responses or not useable.

Estimates of domestic shipments were derived from official statistics of the U.S. Department of Commerce. Standard Industrial Classification (SIC) 3661, 3662, 3573, and 3357 were used. All of SIC 3661, telephone and telegraph apparatus, and SIC 3357B, telephone cable, was used. Only portions of SIC 3662, radio and TV communication apparatus, and SIC 3573, office, computing, and accounting machines, were used.

The allocations applied to the data to divide it into the product groups reported were based on the product detail reported in the current industrial report for each SIC used. The percentage allocations derived from the current industrial reports were then applied to data reported in the Annual Survey of Manufacturers and the Census of Manufacturers, which was the only consistent source of data for 1967-81. Estimates for the product groups for 1982 and 1983 were based on the 1982 Current Industrial Reports.

The following tables give an account of how import and export data were derived. Imports are imports for consumption based on Custom's valuation, and the export data are exports of domestic merchandise based on an f.a.s. (free alongside ship) value. The tables are presented by product groupings, items, numbers, and years. Where only a five-digit class is listed, every item within

that class was used, and every item within that category was given the same weight. The percentage allocations used are based on the staff's knowledge of trade in that particular item. The knowledge is based on previous experience and/or discussions with Custom's import specialists as well as information available through trade journals.

Total telecommunications equipment: TSUS(A) and Schedule B numbers and appropriate allocations used in determining total imports and exports, 1967-83 1/

Item	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
	Percent																
TSUS(A)																	
676.1500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	2.0
676.3030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	2.0
676.5230	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	2.0	2.0	3.0
684.62	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
684.64	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
685.11	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0	2.0	2.0	2.0
685.23	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	-	-	-	-	-	-	-
685.24	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0
685.2560	-	1.0	1.0	1.0	1.0	1.0	1.0	5.0	-	-	-	-	-	-	-	-	-
685.2565	-	-	-	-	-	-	-	-	10.0	10.0	10.0	-	-	-	-	-	-
685.2570	-	-	-	-	-	-	-	-	-	-	10.0	10.0	-	-	-	-	-
685.2575	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	-	-	-	-	-	-
685.2940	-	-	-	-	-	-	-	-		-	-	50.0	50.0	50.0	50.0	50.0	50.0
685.2941	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0
685.2943	-	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.0	25.0	25.0
685.2962	-	-	-	-	-	-	-	-	-	-	-	25.0	25.0	25.0	25.0	25.0	25.0
685.2966	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0
685.2970	-	-	-	-	-	-	-	-	-	-	-	25.0	25.0	25.0	25.0	25.0	25.0
685.2976	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0
685.4009	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
685.4010	-	-	-	-	10.0	10.0	20.0	50.0	50.0	-	-	-	-	-	-	-	-
688.1500	1.0	1.0	1.0	1.0	1.0	1.0	5.0	5.0	5.0	10.0	10.0	10.0	15.0	20.0	20.0	20.0	20.0
688.4000	5.0	5.0	5.0	5.0	5.0	5.0	5.0	50.0	5.0	-	-	-	-	-	-	-	-
688.4040	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	-	-	-
688.4360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0
688.4550	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	-	-
688.4555	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0	-
708.0900	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0
708.2900	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0
Schedule B																	
676.2600	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0
676.2700	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0
676.2820	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0
676.2840	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0
676.2855	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0
676.2860	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0
676.2870	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0
676.5560	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0
676.62	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
676.64	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
685.2007	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0
685.2640	-	-	-	-	-	-	-	-	-	-	-	50.0	50.0	50.0	50.0	50.0	50.0
685.2642	-	-	-	-	-	-	-	-	-	-	-	50.0	50.0	50.0	50.0	50.0	50.0
685.2650	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
685.2660	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
685.2715	-	-	-	-	-	-	-	-	-	-	-	25.0	25.0	25.0	25.0	25.0	25.0
685.2720	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0

See footnote at end of table.

Total telecommunications equipment: TSUS(A) and Schedule B numbers and appropriate allocations used in determining total imports and exports, 1967-83 1/--Continued

Item	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
	Percent																
Schedule B																	
685.2725	-	-	-	-	-	-	-	-	-	-	-	25.0	25.0	25.0	25.0	25.0	25.0
685.2735	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
685.2745	-	-	-	-	-	-	-	-	-	-	-	25.0	25.0	25.0	25.0	25.0	25.0
685.2750	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0
685.2755	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0
685.2760	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0
685.2765	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0
688.0220	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
688.0240	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
688.4060	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0
708.0110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0
708.0600	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	-	-
708.2260	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	-	-
714.9201	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
714.9202	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
714.9204	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
714.9206	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
714.9210	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
714.9212	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
714.9213	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
714.9214	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
714.9215	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
714.9216	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
723.1010	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	-	-	-	-	-	-
724.1015	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
724.9110	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9120	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9130	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9140	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9150	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9155	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9165	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9270	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9905	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	-	-	-	-	-	-
724.9920	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	-	-	-	-	-	-
724.9925	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	-	-	-	-	-	-
724.9935	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9965	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9980	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9985	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-

1/ These allocations were the ones initially used in extracting import and export data, however, once the export data was accumulated it became apparent that there was a large discrepency between pre-1978 and post-1978 export data. This was due to the major overhaul of the schedule B in 1978. Accordingly, pre-1978 data based on these allocations were scaled down by varying factors.

Transmission apparatus: TSUS(A) and Schedule B numbers and appropriate allocations used in determining total imports and exports, 1967-83 1/

Item	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
	Percent																
TSUS(A)																	
684.6200	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	-	-	-	-	-	-	-	-	-
684.6240	-	-	-	-	-	-	-	-	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
684.6440	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
685.23	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	-	-	-	-	-	-	-
685.24	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0
685.2560	1.0	1.0	1.0	1.0	1.0	1.0	1.0	5.0	-	-	-	-	-	-	-	-	-
685.2565	-	-	-	-	-	-	-	-	10.0	10.0	10.0	-	-	-	-	-	-
685.2570	-	-	-	-	-	-	-	-	-	-	10.0	10.0	-	-	-	-	-
685.2575	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	-	-	-	-	-	-
685.2962	-	-	-	-	-	-	-	-	-	-	-	25.0	25.0	25.0	25.0	25.0	25.0
685.2970	-	-	-	-	-	-	-	-	-	-	-	25.0	25.0	25.0	25.0	25.0	25.0
685.2976	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0
688.4000	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	-	-	-	-	-	-	-	-
688.4040	-	-	-	-	-	-	-	-	-	3.0	3.0	3.0	3.0	3.0	-	-	-
688.4360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0
688.4550	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0	3.0	-	-
688.4555	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0	-
Schedule B																	
684.6440	-	-	-	-	-	-	-	-	-	-	-	40.0	40.0	40.0	40.0	40.0	40.0
684.2640	-	-	-	-	-	-	-	-	-	-	-	50.0	50.0	50.0	50.0	50.0	50.0
684.2642	-	-	-	-	-	-	-	-	-	-	-	50.0	50.0	50.0	50.0	50.0	50.0
684.2650	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
684.2660	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
684.2735	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
684.2745	-	-	-	-	-	-	-	-	-	-	-	25.0	25.0	25.0	25.0	25.0	25.0
684.2750	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0
684.2755	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0
684.2760	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
685.2765	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0
724.9130	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9150	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	-	-	-	-	-	-
724.9165	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	-	-	-	-	-	-
724.9270	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9905	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	-	-	-	-	-	-
724.9925	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	-	-	-	-	-	-
724.9935	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9965	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9985	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	-	-	-	-	-	-

1/ These allocations were the ones initially used in extracting import and export data, however, once the export data was accumulated it became apparent that there was a large discrepency between pre-1978 and post-1978 export data. This was due to the major overhaul of the schedule B in 1978. Accordingly, pre-1978 data based on these allocations were scaled down by varying factors.

Switching equipment: TSUSA and Schedule B numbers and appropriate allocations used to derive total imports and exports, 1967-83 1/

(In percent)

Item	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
TSUSA																	
684.6210--	-	-	-	-	-	-	-	-	-	15.0	15.0	15.0	15.0	15.0	10.0	10.0	10.0
Schedule B																	
684.6210--	-	-	-	-	-	-	-	-	-	-	-	90.0	90.0	90.0	90.0	90.0	90.0
684.6240--	-	-	-	-	-	-	-	-	-	-	-	50.0	50.0	50.0	50.0	50.0	50.0
684.6440--	-	-	-	-	-	-	-	-	-	-	-	40.0	40.0	40.0	40.0	40.0	40.0
724.9110--	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9120--	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9150--	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	-	-	-	-	-	-
724.9165--	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	-	-	-	-	-	-
724.9985--	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	-	-	-	-	-	-

1/ These allocations were the ones initially used in extracting import and export data; however, once the export data were accumulated, it became apparent that there was a large discrepency between pre-1978 and post-1978 export data. This was due to the major overhaul of the Schedule B in 1978. Accordingly, pre-1978 data based on these allocations were scaled down by varying factors.

Customer premises equipment: TSUS(A) and Schedule B numbers and appropriate allocations used to derive total imports and exports, 1967-83 1/

Item	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
	Percent																
TSUS(A)																	
676.1500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	2.0
676.3030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	2.0
676.5230	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	2.0	2.0	3.0
684.6200	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	-	-	-	-	-	-	-	-	-
684.6210	-	-	-	-	-	-	-	-	-	85.0	85.0	85.0	85.0	85.0	90.0	90.0	90.0
684.6220	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
684.6230	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
684.6240	-	-	-	-	-	-	-	-	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
684.6420	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
684.6440	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
685.11	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0	2.0	2.0	2.0
685.2940	-	-	-	-	-	-	-	-	-	-	-	50.0	50.0	50.0	50.0	50.0	50.0
685.2941	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0
685.2943	-	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.0	25.0	25.0
685.2966	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0
685.4009	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
685.4010	-	-	-	-	-	10.0	20.0	50.0	50.0	-	-	-	-	-	-	-	-
688.4000	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	-	-	-	-	-	-	-	-
688.4040	-	-	-	-	-	-	-	-	-	2.0	2.0	2.0	2.0	2.0	-	-	-
688.4360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0
688.4550	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0	2.0	-	-
688.4555	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0	-
Schedule B																	
676.2600	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0
676.2700	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0
676.2820	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0
676.2840	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0
676.2855	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0

See footnote at end of table.

Customer premises equipment: TSUS(A) and Schedule B numbers and appropriate allocations used to derive total imports and exports, 1967-83 1/-- Continued

Item	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
	Percent																
Schedule B																	
676.2860	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0
676.2870	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0
676.5560	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0
684.6210	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0
684.6220	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
684.6240	-	-	-	-	-	-	-	-	-	-	-	50.0	50.0	50.0	50.0	50.0	50.0
684.6420	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
684.6440	-	-	-	-	-	-	-	-	-	-	-	20.0	20.0	20.0	20.0	20.0	20.0
685.2007	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0
685.2715	-	-	-	-	-	-	-	-	-	-	-	25.0	25.0	25.0	25.0	25.0	25.0
685.2720	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0	10.0	10.0	10.0
685.2725	-	-	-	-	-	-	-	-	-	-	-	25.0	25.0	25.0	25.0	25.0	25.0
724.1015	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
724.9140	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9150	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	-	-	-	-	-	-
724.9155	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9165	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	-	-	-	-	-	-
724.9201	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
724.9202	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
724.9204	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
724.9206	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
724.9210	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
724.9212	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9213	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9214	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9215	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9216	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	-	-	-	-	-	-
724.9915	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	-	-	-	-	-	-
724.9920	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	-	-	-	-	-	-
724.9980	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	-	-	-
724.9855	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	-	-	-	-	-	-

1/ These allocations were the ones initially used in extracting import and export data, however, once the export data was accumulated it became apparent that there was a large discrepancy between pre-1978 and post-1978 export data. This was due to the major overhaul of the Schedule B in 1978. Accordingly, pre-1978 data based on these allocations were scaled down by varying factors.

Cable, wire and lightguide: TSUSA and Schedule B numbers and appropriate allocations used to derive total imports and exports, 1967-83 1/

(In percent)

Item	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
TSUSA																	
685.1500--	1.0	1.0	1.0	1.0	1.0	1.0	5.0	5.0	5.0	10.0	10.0	10.0	15.0	20.0	20.0	20.0	20.0
708.0900--	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0
708.2900--	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0
Schedule B:																	
688.0220--	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
688.0240--	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0	100.0	100.0	100.0
688.4060--	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	5.0	5.0
708.0600--	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	-	-
708.0110--	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	100.0
708.2260--	-	-	-	-	-	-	-	-	-	-	-	5.0	5.0	5.0	5.0	-	-
723.1010--	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	-	-	-	-	-	-

1/ These allocations were the ones initially used in extracting import and export data; however, once the export data were accumulated, it became apparent that there was a large discrepency between pre-1978 and post-1978 export data. This was due to the major overhaul of the Schedule B in 1978. Accordingly, pre-1978 data based on these allocations were scaled down by varying factors.

APPENDIX J

A DISCUSSION OF EXCHANGE-RATE CHANGES AMONG SELECTED U.S. TRADING PARTNERS

Unless offset by other factors, including differences in relative inflation rates, changes in the value of the U.S. dollar vis-a-vis that of a foreign currency can alter the competitiveness of imports in the United States. For example, a strong dollar and a relatively high rate of U.S. inflation can cause the dollar to increase in value, increasing the competitiveness of imports in the United States.

To determine if changes in exchange rates could have been affected by changes in inflation rates, real exchange-rate indexes are often used. These indexes deflate changes in nominal exchange rates by changes in relative price levels. They show the change in competitiveness between the products of two countries since a base period. 1/ Real exchange rates for the U.S. dollar are determined by the following formula: 2/

$$\text{Real exchange-rate index} = \frac{\text{nominal exchange-rate index} \times \text{U.S. Producer Price Index}}{\text{foreign price index}}$$

If the real exchange-rate index equals 100, the real value of the U.S. dollar has not changed since a base year. If the real exchange-rate index is greater than 100, the dollar has increased in value compared with that in a base year, and U.S. products in general have become less competitive with foreign products. The index would be greater than 100 if either the U.S. price level has risen relative to the foreign price level with no change in nominal exchange rates or the value of the dollar has risen in foreign exchange markets with no offsetting movement in relative price levels. If the real exchange-rate index is less than 100, the dollar has decreased in value compared with that in the base year, and U.S. products in general have become more competitive with foreign products.

1/ The price advantage from exchange-rate changes that foreign producers enjoy in the United States applies only to those imported products that use inputs that are priced in foreign currency. If the foreign producers pay U.S. dollars for all of their inputs, they gain no competitive advantage vis-a-vis that of U.S. producers from currency fluctuations. The price of some inputs must be denominated in the foreign currency for the foreign producer to gain some competitive advantage.

2/ The index of real exchange rates is based on nominal exchange rates expressed in units of foreign currency per U.S. dollar.

APPENDIX K

COMPETITIVE ASSESSMENT OF U.S.- AND FOREIGN-MADE PRODUCTS IN DOMESTIC AND FOREIGN MARKETS AS REPORTED BY RESPONDENTS TO QUESTIONNAIRES OF THE U.S. INTERNATIONAL TRADE COMMISSION

Table K-1.--U.S. producers' competitive assessment of U.S.-made and Japanese-made products in the U.S. market, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	13	0	7	0	4	0	5	5	5	3	5	4	3	5	12	1	3	1
Lower purchase price (delivered)	2	3	0	3	0	1	1	4	2	2	1	3	2	4	3	1	1	0
Shorter delivery time	9	0	3	0	1	0	2	0	0	0	1	1	1	2	3	0	1	0
Availability	10	0	5	0	3	0	4	1	4	1	3	2	1	2	6	0	3	0
Servicing training	8	0	4	0	5	0	5	0	1	0	4	0	1	0	3	0	0	0
Favorable financing terms	1	2	1	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Favorable warranties	2	1	2	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0
Historical supplier relationship	11	0	6	0	3	0	4	1	3	0	2	0	1	1	8	0	1	0
Availability of spare parts	6	0	3	0	1	0	2	0	0	0	3	0	1	0	2	0	0	0
Compatibility with existing systems	9	0	5	0	2	0	1	0	2	0	2	1	1	0	8	0	1	0
Lower installation costs	2	1	2	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0
Product performance features:																		
Superior design	5	0	4	0	1	0	3	3	2	1	2	1	0	1	2	0	0	1
Higher productivity (man-hour output ratio)	0	2	1	1	0	0	0	3	0	1	0	1	0	1	2	0	0	1
More durable	3	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Less maintenance	2	0	3	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
Energy efficiency	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	1	3	0	0	2	1	0	0	0	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Do you expect these characteristics to change during 1984-88	4	9	2	4	1	3	4	6	5	2	3	4	0	7	3	6	1	3
Do you expect these characteristics to change during 1989-93	3	10	2	4	2	2	3	6	4	3	3	3	0	6	2	6	1	3

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table K-2.--U.S. producers' competitive assessment of U.S.-made and West German-made products in the U.S. market, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	11	0	6	0	3	0	6	0	5	0	6	1	7	0	10	0	2	0
Lower purchase price (delivered)	6	0	3	0	1	0	3	0	3	0	0	0	3	0	5	0	1	0
Shorter delivery time	6	0	2	0	0	0	2	0	1	0	1	0	2	0	3	0	0	0
Availability	8	0	3	0	1	0	4	0	3	0	2	0	3	0	4	0	1	0
Servicing training	7	0	3	0	1	0	3	0	1	0	4	0	2	0	5	0	0	0
Favorable financing terms	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Favorable warranties	2	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Historical supplier relationship	10	0	6	0	3	0	2	0	1	0	2	0	2	0	7	0	1	0
Availability of spare parts	4	0	2	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0
Compatibility with existing systems	5	0	4	0	2	0	1	0	1	0	3	0	2	0	8	0	0	0
Lower installation costs	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Product performance features:																		
Superior design	5	0	3	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Higher productivity (man-hour output ratio)	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
More durable	1	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Less maintenance	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy efficiency	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	1	0	1	0	0	1	0	0	1	0	1	0	0	1	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Do you expect these characteristics to change during 1984-88	0	11	0	6	0	3	0	5	0	5	1	5	0	7	3	4	0	3
Do you expect these characteristics to change during 1989-93	0	11	0	6	0	3	0	5	0	5	1	5	0	7	3	4	0	3

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table K-3.--U.S. producers' competitive assessment of U.S.-made and Canadian-made products in the U.S. market, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	11	0	7	1	2	2	8	1	7	0	4	4	5	3	10	0	4	0
Lower purchase price (delivered)	4	1	5	1	2	1	4	1	4	0	2	2	1	2	5	0	3	0
Shorter delivery time	6	0	5	0	2	0	3	1	1	0	2	0	1	0	3	0	1	0
Availability	7	0	6	1	2	1	6	1	3	0	4	1	3	2	5	0	2	0
Servicing training	6	0	3	0	0	1	2	0	1	0	1	1	0	1	5	0	1	0
Favorable financing terms	1	0	2	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0
Favorable warranties	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Historical supplier relationship	10	0	5	0	0	0	3	1	3	0	1	2	1	1	8	0	1	0
Availability of spare parts	5	0	2	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0
Compatibility with existing systems	6	0	4	1	1	0	2	0	1	0	1	0	0	1	8	0	1	0
Lower installation costs	3	0	2	0	0	0	0	1	1	0	1	1	0	0	1	0	0	0
Product performance features:																		
Superior design	3	0	3	0	1	0	1	0	1	0	1	0	0	1	2	0	1	0
Higher productivity (man-hour output ratio)	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
More durable	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less maintenance	3	0	2	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0
Energy efficiency	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Do you expect these characteristics to change during 1984-88	1	11	3	5	2	2	0	8	0	6	0	6	0	7	2	5	1	2
Do you expect these characteristics to change during 1989-93	1	10	2	5	2	2	0	6	0	6	2	4	1	5	1	4	1	2

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table K-4.--U.S. producers' competitive assessment of U.S.-made and British-made products in the U.S. market, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	11	0	6	0	3	0	7	0	6	0	6	0	7	0	10	0	2	0
Lower purchase price (delivered)	4	0	3	0	1	0	3	0	3	0	1	0	3	0	5	0	1	0
Shorter delivery time	6	0	2	0	0	0	2	0	1	0	1	0	2	0	3	0	0	0
Availability	8	0	4	0	2	0	4	0	3	0	3	0	4	0	4	0	1	0
Servicing training	7	0	3	0	1	0	3	0	2	0	3	0	2	0	4	0	1	0
Favorable financing terms	1	0	2	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Favorable warranties	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Historical supplier relationship	7	0	4	0	2	0	3	0	3	0	2	0	3	0	5	0	1	0
Availability of spare parts	6	0	3	0	1	0	1	0	2	0	3	0	1	0	1	0	1	0
Compatibility with existing systems	6	0	4	0	2	0	1	0	2	0	3	0	2	0	5	0	1	0
Lower installation costs	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Product performance features:																		
Superior design	6	0	3	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Higher productivity (man-hour output ratio)	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
More durable	3	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Less maintenance	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy efficiency	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Do you expect these characteristics to change during 1984-88	0	11	0	6	0	3	0	6	0	6	0	6	0	7	1	6	0	3
Do you expect these characteristics to change during 1989-93	0	11	1	5	1	2	0	6	0	6	0	5	0	6	0	7	0	3

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table K-5.--U.S. producers' competitive assessment of U.S.-made and French-made products in the U.S. market, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	11	0	6	0	3	0	7	0	6	0	7	0	6	0	10	0	2	0
Lower purchase price (delivered)	5	0	4	0	1	0	3	0	4	0	1	0	3	0	5	0	1	0
Shorter delivery time	7	0	3	0	0	0	2	0	1	0	1	0	2	0	3	0	0	0
Availability	8	0	4	0	2	0	4	0	4	0	4	0	4	0	6	0	2	0
Servicing training	7	0	4	0	1	0	3	0	2	0	3	0	2	0	4	0	1	0
Favorable financing terms	1	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Favorable warranties	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Historical supplier relationship	7	0	4	0	2	0	3	0	3	0	4	0	3	0	6	0	1	0
Availability of spare parts	4	0	2	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0
Compatibility with existing systems	8	0	5	0	2	0	2	0	2	0	3	0	2	0	6	0	1	0
Lower installation costs	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Product performance features:																		
Superior design	7	0	3	0	1	0	1	0	0	0	2	0	0	0	0	0	0	0
Higher productivity (man-hour output ratio)	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
More durable	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less maintenance	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy efficiency	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Do you expect these characteristics to change during 1984-88	0	11	1	5	1	2	0	6	0	6	1	6	0	6	2	5	0	3
Do you expect these characteristics to change during 1989-93	0	11	0	6	0	3	0	6	0	6	1	5	0	6	1	6	0	3

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table K-6.--U.S. producers' competitive assessment of U.S.-made and Dutch-made products in the U.S. market, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	11	0	6	0	3	0	6	0	6	0	5	1	6	0	10	0	2	0
Lower purchase price (delivered)	3	0	3	0	1	0	4	0	4	0	0	1	3	0	5	0	1	0
Shorter delivery time	5	0	2	0	0	0	2	0	1	0	1	0	2	0	3	0	0	0
Availability	7	0	3	0	1	0	3	0	3	0	3	0	3	0	4	0	1	0
Servicing training	5	0	3	0	1	0	3	0	2	0	2	1	2	0	4	0	1	1
Favorable financing terms	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Favorable warranties	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Historical supplier relationship	7	0	5	0	3	0	4	0	3	0	3	0	4	0	7	0	2	1
Availability of spare parts	3	0	2	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0
Compatibility with existing systems	7	0	4	0	2	0	1	0	2	0	3	0	2	0	7	0	1	0
Lower installation costs	2	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Product performance features:																		
Superior design	7	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Higher productivity (man-hour output ratio)	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
More durable	2	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Less maintenance	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy efficiency	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Do you expect these characteristics to change during 1984-88	0	11	0	6	0	3	0	6	0	6	0	6	0	6	1	8	0	3
Do you expect these characteristics to change during 1989-93	0	11	0	6	0	3	0	6	0	6	0	5	0	6	0	8	0	3

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table K-7.--U.S. producers' competitive assessment of U.S.-made and Swedish-made products in the U.S. market, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	11	0	6	0	3	0	6	0	6	0	7	0	6	0	12	0	1	0
Lower purchase price (delivered)	4	0	3	0	1	0	3	0	4	0	1	0	3	0	9	0	1	0
Shorter delivery time	7	0	2	0	0	0	2	0	1	0	1	0	2	0	4	0	0	0
Availability	8	0	4	0	2	0	4	0	4	0	4	0	4	0	8	0	1	0
Servicing training	6	0	3	0	1	0	3	0	2	0	3	0	2	0	5	0	1	0
Favorable financing terms	1	0	2	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Favorable warranties	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Historical supplier relationship	8	0	4	0	2	0	3	0	2	0	3	0	2	0	11	0	1	0
Availability of spare parts	3	0	2	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0
Compatibility with existing systems	4	0	4	0	2	0	1	0	2	0	3	0	2	0	10	0	0	0
Lower installation costs	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Product performance features:																		
Superior design	5	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Higher productivity (man-hour output ratio)	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
More durable	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less maintenance	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy efficiency	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	1	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Do you expect these characteristics to change during 1984-88	1	10	1	5	1	2	0	6	0	5	1	6	0	6	1	8	0	2
Do you expect these characteristics to change during 1989-93	1	10	1	5	1	2	0	6	0	5	1	5	0	6	0	8	0	2

Source: Compiled from data submitted in response to questionnaires of the U.S. International Ttrade Commission.

Table K-8.--U.S. producers'competitive assessment of U.S.-made and foreign made products in Japanese markets, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data display terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	2	9	1	7	0	6	1	5	1	4	1	5	0	4	4	4	1	5
Lower purchase price (delivered)	2	8	1	7	0	6	0	6	1	3	0	5	0	4	0	4	0	6
Shorter delivery time	3	1	2	1	0	1	0	3	0	1	0	2	0	1	0	2	0	1
Availability	3	1	2	1	0	1	0	1	0	1	0	1	0	1	1	1	1	1
Servicing training	3	1	2	1	1	1	0	1	0	0	0	1	0	0	0	0	0	1
Favorable financing terms	1	7	1	6	0	3	0	4	0	2	0	3	0	3	0	3	0	6
Favorable warranties	2	0	2	0	0	0	1	0	0	0	1	0	0	0	0	1	1	0
Historical supplier relationship	2	5	2	3	0	2	0	5	0	2	0	4	0	2	2	3	0	3
Availability of spare parts	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Compatibility with existing systems	2	4	2	2	0	1	0	1	0	1	0	1	0	0	2	0	1	0
Lower installation costs	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Product performance features:																		
Superior design	2	1	3	0	1	0	1	0	0	0	2	1	0	0	2	1	1	0
Higher productivity (man-hour output ratio)	0	1	1	1	0	1	0	0	0	0	0	1	0	0	1	0	1	2
More durable	2	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0	1	0
Less maintenance	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Energy efficiency	1	0	2	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0
Other	0	0	1	1	0	0	0	1	0	0	0	2	0	0	0	0	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
you expect these characteristics to change during 1984-88	1	9	0	7	0	5	1	15	0	5	0	15	0	4	2	5	0	6
you expect these characteristics to change during 1989-93	1	7	0	5	1	2	2	4	0	4	1	4	0	3	3	2	0	3

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table K-9.--U.S. producers' competitive assessment of U.S.-made and foreign made products in West German markets, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data display terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	4	5	4	3	2	1	2	4	3	1	3	2	3	1	4	4	2	2
Lower purchase price (delivered)	3	1	2	2	1	0	1	2	1	0	1	0	1	0	1	1	0	1
Shorter delivery time	4	0	2	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1
Availability	2	3	0	1	0	0	1	0	0	0	1	1	0	0	2	1	1	0
Servicing training	2	1	3	0	1	0	0	0	1	0	1	1	1	0	1	1	1	1
Favorable financing terms	0	3	1	4	0	2	0	4	0	2	0	2	0	2	0	3	0	3
Favorable warranties	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Historical supplier relationship	1	4	1	3	0	1	0	3	0	1	0	2	0	1	4	3	0	2
Availability of spare parts	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Compatibility with existing systems	1	3	1	1	0	0	0	1	0	0	0	1	0	0	3	0	1	0
Lower installation costs	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Product performance features:																		
Superior design	6	0	5	0	2	0	2	0	2	0	3	0	2	0	2	1	3	0
Higher productivity (man-hour output ratio)	0	1	1	1	0	0	1	0	0	0	1	0	0	0	1	0	1	0
More durable	1	1	1	1	0	0	1	0	0	0	1	0	0	0	0	0	1	0
Less maintenance	2	0	2	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0
Energy efficiency	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Do you expect these characteristics to change during 1984-88	0	7	0	5	0	3	0	5	0	4	0	6	0	4	2	5	0	4
Do you expect these characteristics to change during 1989-93	0	7	0	5	0	3	0	5	0	4	0	6	0	4	2	5	0	4

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table K-10--U.S. producers' competitive assessment of U.S.-made and foreign-made products in Canadian markets, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data display terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	6	2	4	1	3	0	4	0	5	0	2	4	3	1	12	0	6	0
Lower purchase price (delivered)	2	1	2	0	0	0	1	1	1	0	0	4	0	1	2	0	3	0
Shorter delivery time	2	1	0	1	0	0	0	0	0	0	0	1	0	0	1	0	3	0
Availability	4	0	1	0	0	0	1	0	0	0	1	3	1	1	4	0	3	0
Servicing training	4	1	3	0	2	0	2	0	2	0	2	1	1	0	3	0	6	0
Favorable financing terms	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Favorable warranties	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Historical supplier relationship	2	2	1	1	1	0	2	1	1	0	1	3	0	0	7	0	1	1
Availability of spare parts	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Compatibility with existing systems	3	1	1	0	0	0	0	0	0	0	0	1	0	0	4	0	1	0
Lower installation costs	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Product performance features:																		
Superior design	5	0	3	0	2	0	1	0	2	0	1	1	1	0	3	0	3	0
Higher productivity (man-hour output ratio)	2	0	2	0	1	0	0	0	0	0	0	1	0	0	1	0	2	0
More durable	3	0	2	0	1	0	0	0	1	0	0	0	0	0	1	0	2	0
Less maintenance	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Energy efficiency	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
you expect these characteristics to change during 1984-88	0	8	1	4	1	2	0	5	0	4	0	7	0	4	0	9	2	4
you expect these characteristics to change during 1989-93	0	8	1	4	1	2	0	5	0	4	0	6	0	4	1	7	0	4

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table K-11.--U.S. producers' competitive assessment of U.S.-made and foreign-made products in British markets, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data display terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	4	6	4	3	2	1	4	5	3	2	3	3	3	1	6	3	2	2
Lower purchase price (delivered)	1	2	2	1	0	0	0	3	0	0	0	1	0	0	1	1	0	1
Shorter delivery time	1	2	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Availability	2	4	3	1	2	0	3	0	1	0	3	1	1	0	4	1	1	1
Servicing training	2	1	3	0	1	0	1	0	1	0	2	1	0	0	1	0	1	1
Favorable financing terms	1	2	2	2	0	1	0	2	0	1	0	1	0	1	0	1	0	2
Favorable warranties	2	0	3	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0
Historical supplier relationship	0	6	1	4	0	2	2	3	0	2	0	4	0	2	4	2	0	3
Availability of spare parts	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Compatibility with existing systems	0	4	1	1	0	0	0	0	0	1	0	2	0	0	3	0	1	0
Lower installation costs	2	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Product performance features:																		
Superior design	6	0	5	0	2	0	2	0	2	0	3	0	2	0	3	0	2	0
Higher productivity (man-hour output ratio)	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
More durable	1	1	1	1	0	0	1	0	0	0	1	0	0	0	1	0	1	0
Less maintenance	3	0	2	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0
Energy efficiency	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Do you expect these characteristics to change during 1984-88	1	8	0	6	0	3	0	10	0	4	1	6	0	4	2	7	0	4
Do you expect these characteristics to change during 1989-93	0	9	0	6	0	3	0	9	0	4	1	6	0	4	2	7	0	4

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table K-12.--U.S. producers' competitive assessment of U.S.-made and foreign-made products in French markets, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data display terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	4	9	3	5	1	3	3	4	3	2	3	4	4	1	4	5	3	2
Lower purchase price (delivered)	2	1	1	2	0	1	0	1	0	0	0	1	0	0	0	1	0	1
Shorter delivery time	2	2	1	2	0	1	0	0	0	0	0	1	0	0	0	2	0	1
Availability	2	3	1	2	0	1	1	0	0	0	1	1	0	0	1	2	1	0
Servicing training	3	1	3	0	0	0	0	0	0	0	1	1	1	0	1	0	0	1
Favorable financing terms	1	3	2	3	0	2	0	3	0	1	0	1	0	1	0	0	1	2
Favorable warranties	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Historical supplier relationship	1	4	1	3	0	2	0	3	0	1	0	3	0	1	3	2	1	1
Availability of spare parts	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Compatibility with existing systems	1	3	1	2	0	1	0	1	0	1	0	1	0	0	2	2	1	0
Lower installation costs	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Product performance features:																		
Superior design	3	0	4	0	1	0	2	0	1	0	3	0	2	0	1	2	2	0
Higher productivity (man-hour output ratio)	1	0	2	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0
More durable	2	0	2	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0
Less maintenance	2	0	2	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0
Energy efficiency	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
you expect these characteristics to change during 1984-88	0	8	0	6	0	2	0	6	0	2	0	6	0	3	1	6	0	3
you expect these characteristics to change during 1989-93	0	9	0	7	0	3	0	7	0	3	0	7	0	4	1	7	0	4

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table K-13.--U.S. producers' competitive assessment of U.S.-made and foreign-made products in Dutch markets, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data display terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	4	4	4	2	2	1	2	2	3	1	3	2	3	1	4	4	1	1
Lower purchase price (delivered)	2	1	1	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Shorter delivery time	2	1	1	1	0	0	0	0	0	0	0	1	0	0	1	1	0	0
Availability	3	2	1	1	1	0	1	0	1	0	2	1	1	0	3	0	0	0
Servicing training	2	1	1	1	0	1	0	1	0	1	1	2	0	1	0	2	0	1
Favorable financing terms	1	1	1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
Favorable warranties	2	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Historical supplier relationship	1	4	0	3	0	2	0	3	0	2	0	3	0	2	4	3	0	2
Availability of spare parts	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Compatibility with existing systems	1	2	0	1	0	0	0	0	0	0	0	1	0	0	3	0	0	0
Lower installation costs	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Product performance features:																		
Superior design	4	0	5	0	2	0	2	0	2	0	3	0	2	0	2	0	0	0
Higher productivity (man-hour output ratio)	0	1	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0
More durable	1	1	0	1	0	0	1	0	0	0	2	1	0	0	0	0	0	0
Less maintenance	2	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
Energy efficiency	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Do you expect these characteristics to change during 1984-88	0	8	0	6	0	3	0	5	0	4	0	6	0	4	0	7	0	3
Do you expect these characteristics to change during 1989-93	0	7	0	5	0	2	0	4	0	3	0	5	0	3	0	6	0	2

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table K-14.--U.S. producers' competitive assessment of U.S.-made and foreign-made products in Swedish markets, by product groups, 1981-83

Item	Transmission equipment		Switching equipment		Class 5 central office equipment		Customer premises equipment		Telephone sets		Private branch exchanges		Key system switching equipment		Data display terminals		Cable, wire, and lightguide	
	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Overall competitive advantage	5	4	3	4	0	3	1	4	1	3	1	4	2	2	5	3	0	3
Lower purchase price (delivered)	3	1	2	2	0	1	0	1	0	0	0	1	0	0	2	0	0	0
Shorter delivery time	3	1	2	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Availability	2	1	1	2	0	1	0	0	1	1	1	0	0	2	0	0	0	0
Servicing training	3	0	2	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0
Favorable financing terms	1	3	2	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2
Favorable warranties	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Historical supplier relationship	1	4	1	4	0	3	0	2	0	3	0	4	0	2	3	2	0	3
Availability of spare parts	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Compatibility with existing systems	1	2	1	3	0	2	0	0	0	0	0	2	0	0	3	0	0	1
Lower installation costs	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Product performance features:																		
Superior design	5	0	4	1	1	1	0	0	0	0	1	0	1	0	2	0	0	0
Higher productivity (man-hour output ratio)	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
More durable	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less maintenance	3	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Energy efficiency	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Do you expect these characteristics to change during 1984-88	0	9	0	7	0	3	0	6	0	4	1	4	0	4	0	8	0	3
Do you expect these characteristics to change during 1989-93	0	9	0	7	0	3	0	6	0	4	1	4	0	4	0	8	0	3

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

APPENDIX L

THE CONSTRUCTION OF THE BASELINE SCENARIO, THE RESPONDENT SCENARIO, AND THE OPEN MARKET SCENARIO

The Baseline Scenario is based on a linear regression relating U.S. Gross National Product (GNP) to shipments and imports of telecommunications equipment and world GNP to exports of telecommunications equipment. The historical data on the telecommunications equipment industry are U.S. International Trade Commission estimates of shipments, imports, exports, and consumption of cable, wire, and lightguide and transmission, switching, and customer premises equipment. These historical data cover the period 1967-83. The U.S. GNP values are historical and projected figures from McGraw-Hill's U.S. Business Outlook, Long Term, published in August 1983. Of the three McGraw-Hill forecasts the midrange one was used. The historical values for world GNP were obtained from the CIA's Handbook of Economic Statistics, and the forecast figures were based on world GNP growth rates given by the World Bank in its World Development Report. By using the equations obtained from the regression analysis, values were forecast for each market segment. These equations are shown below.

Baseline Scenario

Equations	R-Square	F Value
Transmission equipment		
Consumption = 2.43 (GNP) - 3965.94	.63	28.20
Imports = .09 (GNP) - 120.32	.22	4.11
Exports = .02 (WGNP) - 153.66	.86	96.56
World consumption = .98 (WGNP) - 2587.00	.69	25.47
Switching equipment		
Consumption = 1.11 (GNP) - 37.99	.53	16.78
Imports = .04 (GNP) - 112.03	.50	6.04
Exports = .07 (WGNP) - 609.80	.70	37.60
World consumption = 2.31 (WGNP) - 17520.86	.71	40.23
Customer premises equipment		
Consumption = 3.90 (GNP) - 5199.13	.77	55.22
Imports = .56 (GNP) - 2194.39	.73	43.64
Exports = .08 (WGNP) - 541.97	.93	200.80
World consumption = 1.29 (WGNP) - +356.979	.64	20.66
Cable, wire, and lightguide		
Consumption = .96 (GNP) - 1284.43	.85	91.51
Imports = .04 (GNP) - 88.51	.66	31.61
Exports = .02 (WGNP) - 161.69	.82	73.47
World consumption = 1.02 (WGNP) - 6439.27	.82	50.36

All of the data used were converted to 1983 dollars prior to running the regressions. GNP was changed to 1983 dollars by using the GNP deflator from the U.S. Business Outlook, Long Term, and the telecommunications equipment data were transformed by using a price deflator from the Bureau of Labor Statistics. The one exception to this was in the case of cable, wire, and lightguide. Because of rapidly declining prices in this segment, it was felt that the use of a price deflator was not appropriate. After consultation with industry economists, it was determined that such an index would be extremely difficult to estimate, and the best approximation would be that current dollars are equal to constant dollars. As a result, the data for cable, wire, and lightguide were not transformed.

During the historical period the telecommunications industry went through several periods of growth and decline. Because the regression analysis averages out these periods, it predicts a more constant growth that lessens both the rates of increase and the rates of decline. When this analysis is applied to data that take an abrupt and extreme upturn in the last year or two, it will predict abnormally low values unless this upturn was a temporary abberation of the market. The increases in the various segments of the telecommunications industry were not considered to be temporary, but a permanent change in the level of the market. To accommodate this assumption, the 1983 figures were used as a jumping off point for projections that maintained the same rate of increase as those of the regressions. The results of this process are shown in tables L1-L5. The actual results of the regression equations are shown in the tables L6-L9.

The Respondent Scenario was constructed from consumption data reported in the questionnaires that were answered by purchasers of telecommunications equipment. The average figures were used as the midpoints of both the short and long term, and a straight-line trend was constructed to fit the interval between them. Imports and exports were held at the same proportion of consumption they were at in 1983. This was done because the import and export information from respondents was too erratic to be meaningful. The results of this process are shown in table L10.

The Open Market Scenario is an aggregate of information from published sources, industry participants, and financial analysts that follow the telecommunications industry. The various trends and expected occurrences in the market and the economy have been subjectively molded into this scenario. The projections arrived at in this manner are shown in tables L11-L15.

Table L-1.--Total telecommunications equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the Baseline Scenario, 1967-93

Year	Producers' shipments	Exports	Imports	Apparent consumption	World consumption 1/	Ratio of--	
						Imports to U.S. consumption	Exports to producers' shipments
	Million 1983 dollars					Percent	
1967	9,672	178	80	9,574	2/	0.8	1.8
1968	9,862	188	129	9,803	2/	1.3	1.9
1969	11,123	280	106	11,258	2/	.9	2.5
1970	12,571	299	151	12,423	2/	1.2	2.4
1971	12,451	278	205	12,379	2/	1.7	2.2
1972	13,006	268	223	21,961	37,847	1.7	2.1
1973	14,350	326	317	14,341	46,347	2.2	2.3
1974	14,288	496	385	14,178	45,825	2.7	3.5
1975	10,634	558	256	10,332	36,058	2.5	5.2
1976	10,515	615	186	10,086	34,914	1.8	5.9
1977	13,670	761	246	13,155	42,175	1.9	5.6
1978	14,894	1,001	426	14,319	49,743	3.0	6.7
1979	18,025	1,147	576	17,455	55,280	3.3	6.4
1980	18,300	1,232	872	17,939	54,437	4.9	6.7
1981	18,881	1,284	811	18,408	54,527	4.4	6.8
1982	17,591	1,425	1,106	17,272	53,839	6.4	8.1
1983	17,834	1,342	1,990	18,483	54,463	10.8	7.5
1984 1/	19,062	1,360	2,268	19,970	54,839	11.4	7.1
1985 1/	20,376	1,449	2,562	21,489	57,104	11.9	7.1
1986 1/	21,454	1,537	2,801	22,718	59,301	12.3	7.2
1987 1/	22,209	1,626	2,968	23,551	61,582	12.6	7.3
1988 1/	23,129	1,722	3,172	24,579	64,011	12.9	7.4
1989 1/	24,237	1,812	3,418	25,843	66,283	13.2	7.5
1990 1/	25,303	1,908	3,655	27,050	68,730	13.5	7.5
1991 1/	26,126	2,006	3,837	27,957	71,238	13.7	7.7
1992 1/	27,222	2,107	4,082	29,197	73,805	14.0	7.7
1993 1/	28,187	2,202	4,297	30,282	76,252	14.2	7.8

1/ Estimated by the staff of the U.S. International Trade Commission.
2/ Not available.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table L-2.--Transmission equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the Baseline Scenario, 1967-93

Year	Producers' shipments	Exports	Imports	Apparent consumption	World consumption 1/	Ratio of--	
						Imports to U.S. consumption	Exports to producers' shipments
	Million 1983 dollars					Percent	
1967	1,817	19	49	1,847	2/	2.7	1.1
1968	1,930	22	79	1,988	2/	4.0	1.1
1969	2,036	25	66	2,078	2/	3.2	1.2
1970	2,080	30	92	2,091	2/	4.4	1.5
1971	1,912	29	124	2,007	2/	6.2	1.5
1972	2,030	33	135	2,132	7,155	6.3	1.6
1973	2,138	41	187	2,284	8,548	8.2	1.9
1974	2,146	64	223	2,305	8,409	9.7	3.0
1975	1,833	65	67	1,837	6,802	3.8	3.5
1976	1,884	79	62	1,867	6,859	3.3	4.2
1977	2,384	89	75	2,369	8,359	3.1	3.7
1978	2,631	104	95	2,622	10,503	3.6	3.9
1979	3,192	124	103	3,171	11,024	3.3	3.9
1980	3,785	124	115	3,777	10,737	3.0	3.3
1981	4,643	142	122	4,623	11,727	2.6	3.1
1982	4,891	152	202	4,941	12,041	4.1	3.1
1983	4,970	148	332	5,154	12,166	6.4	3.0
1984 1/	5,415	150	357	5,622	12,166	6.3	2.8
1985 1/	5,886	159	384	6,111	12,581	6.3	2.8
1986 1/	6,272	169	406	6,509	12,980	6.3	2.7
1987 1/	6,540	178	421	6,783	13,398	6.3	2.8
1988 1/	6,867	188	440	7,119	13,843	6.2	2.7
1989 1/	7,264	198	462	7,528	14,258	6.2	2.8
1990 1/	7,644	208	484	7,920	14,706	6.2	2.8
1991 1/	7,936	218	501	8,219	15,165	6.1	2.8
1992 1/	8,327	229	524	8,622	15,635	6.1	2.8
1993 1/	8,671	239	544	8,976	16,084	6.1	2.8

1/ Estimated by the staff of the U.S. International Trade Commission.
2/ Not available.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table L-3.--Switching equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the Baseline Scenario, 1967-93

Year	Producers' shipments	Exports	Imports	Apparent consumption	World consumption 1/	Ratio of--	
						Imports to U.S. consumption	Exports to producers' shipments
	Million 1983 dollars					Percent	
1967	1,915	30	2/	1,886	3/	3/	1.5
1968	2,076	32	2/	2,044	3/	3/	1.5
1969	2,553	41	2/	2,512	3/	3/	1.6
1970	2,947	56	2/	2,891	3/	3/	1.9
1971	3,162	76	2/	3,086	3/	3/	2.4
1972	3,008	47	2/	2,962	10,103	3/	1.5
1973	3,262	58	2/	3,204	12,377	3/	1.8
1974	3,495	78	2/	3,417	12,235	3/	2.2
1975	2,756	100	2/	2,656	9,413	3/	3.6
1976	2,666	131	7	2,542	9,048	0.3	4.9
1977	3,571	147	9	3,432	11,229	.3	4.1
1978	3,783	286	17	3,514	12,819	.5	7.6
1979	4,323	328	32	4,027	14,523	.8	7.6
1980	4,268	385	35	3,919	14,689	.9	9.0
1981	3,820	442	17	3,396	14,205	.5	11.5
1982	3,497	571	18	2,945	13,856	.6	16.3
1983	3,593	534	28	3,086	13,751	.9	14.9
1984 1/	3,750	542	34	3,242	13,927	1.1	14.5
1985 1/	3,929	583	41	3,387	14,796	1.3	14.9
1986 1/	4,079	623	46	3,502	15,642	1.4	15.3
1987 1/	4,188	664	50	3,574	16,518	1.4	15.9
1988 1/	4,319	708	55	3,666	17,450	1.6	16.4
1989 1/	4,472	749	61	3,784	18,319	1.7	16.8
1990 1/	4,622	793	66	3,895	19,258	1.7	17.2
1991 1/	4,741	838	70	3,973	20,220	1.8	17.7
1992 1/	4,894	884	76	4,086	21,206	1.9	18.1
1993 1/	5,031	928	81	4,184	22,145	2.0	18.5

1/ Estimated by the staff of the U.S. International Trade Commission.
2/ Negligible or nil.
3/ Not available.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table L-4.--Customer premises equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the Baseline Scenario, 1967-93

Year	Producers' shipments	Exports	Imports	Apparent consumption	World consumption 1/	Ratio of--	
						Imports to U.S. consumption	Exports to producers' shipments
	Million 1983 dollars					Percent	
1967	3,587	108	31	3,511	2/	0.8	3.0
1968	3,724	103	50	3,671	2/	1.4	2.8
1969	4,410	190	39	4,259	2/	.9	4.3
1970	4,833	171	60	4,721	2/	1.2	3.5
1971	4,725	143	81	4,663	2/	1.7	3.0
1972	5,118	155	88	5,051	12,881	1.7	3.0
1973	5,630	177	128	5,581	15,753	2.3	3.1
1974	5,599	262	160	5,497	15,969	2.9	4.7
1975	4,281	296	184	4,169	13,022	4.4	6.9
1976	4,057	340	110	3,827	12,101	2.9	8.4
1977	5,404	387	155	5,172	14,202	3.0	7.2
1978	6,191	450	306	6,048	16,372	5.1	7.3
1979	7,633	539	425	7,520	19,004	5.7	7.1
1980	7,834	568	511	7,776	19,279	6.6	7.3
1981	8,066	564	633	8,136	10,101	7.8	7.0
1982	7,288	567	844	7,565	18,815	11.2	7.7
1983	7,392	495	1,582	8,479	19,638	18.7	6.7
1984 1/	7,800	501	1,820	9,199	19,746	19.8	6.4
1985 1/	8,397	530	2,071	9,938	20,277	20.8	6.3
1986 1/	8,818	558	2,276	10,536	20,792	21.6	6.3
1987 1/	9,111	587	2,419	10,943	21,326	22.1	6.4
1988 1/	9,469	618	2,593	11,444	21,895	22.7	6.5
1989 1/	9,902	647	2,804	12,059	22,425	23.3	6.5
1990 1/	10,318	678	3,007	12,647	22,999	23.8	6.6
1991 1/	10,637	710	3,163	13,090	23,588	24.2	6.7
1992 1/	11,066	743	3,372	13,695	24,189	24.6	6.7
1993 1/	11,442	774	3,556	13,224	24,762	25.0	6.8

1/ Estimated by the staff of the U.S. International Trade Commission.
2/ Not available.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table L-5.--Cable, wire, and lightguide: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the Baseline Scenario, 1967-93

Year	Producers' shipments	Exports	Imports	Apparent consumption	World consumption 1/	Ratio of--	
						Imports to U.S. consumption	Exports to producers' shipments
	Million 1983 dollars					Percent	
1967	2,389	60	2/	2,330	3/	3/	2.4
1968	2,184	83	2/	2,100	3/	3/	3.8
1969	2,473	64	2/	2,410	3/	3/	2.6
1970	2,842	103	2/	2,739	3/	3/	3.6
1971	2,695	73	2/	2,622	3/	3/	2.7
1972	2,895	79	1	2,816	7,708	2/	2.7
1973	3,380	112	4	3,272	9,669	0.1	3.3
1974	3,145	192	6	2,959	9,212	.2	6.1
1975	1,828	161	4	1,671	6,821	.2	8.8
1976	1,935	95	9	1,850	6,905	.5	4.9
1977	2,371	199	10	2,182	8,385	.5	8.3
1978	2,355	231	12	2,136	10,049	.6	9.8
1979	2,935	220	23	2,737	10,731	.8	7.5
1980	2,566	136	38	2,468	9,732	1.5	5.3
1981	2,366	157	44	2,253	9,494	2.0	6.6
1982	1,924	147	45	1,822	9,127	2.5	7.6
1983	1,879	165	49	1,763	8,909	2.8	8.7
1984 1/	2,017	167	57	1,907	9,000	3.0	8.8
1985 1/	2,164	177	66	2,053	9,450	3.2	8.6
1986 1/	2,285	187	73	2,171	9,887	3.4	8.6
1987 1/	2,370	197	78	2,251	10,340	3.5	8.8
1988 1/	2,474	208	84	2,350	10,823	3.6	8.9
1989 1/	2,599	218	91	2,472	11,281	3.7	8.8
1990 1/	2,719	229	98	2,588	11,767	3.8	8.8
1991 1/	2,812	240	103	2,675	12,265	3.8	9.0
1992 1/	2,935	251	110	2,794	12,775	3.9	9.0
1993 1/	3,043	261	116	2,898	13,261	4.0	9.0

1/ Estimated by the staff of the U.S. International Trade Commission.
2/ Negligble or nil.
3/ Not available.

Source: Computed by the U.S. International Trade Commission.

Table L-6.--Transmission equipment: U.S. exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the regression equations used in the Baseline Scenario, 1967-93

(In millions of 1983 dollars)

Year	U.S. exports	U.S. imports	Apparent consumption	World consumption 1/
1967	10	71	1,337	5,335
1968	22	83	1,670	5,898
1969	31	88	1,816	6,329
1970	36	89	1,820	6,602
1971	34	91	1,900	6,511
1972	46	108	2,349	7,077
1973	57	119	2,663	7,582
1974	64	119	2,643	7,921
1975	60	116	2,569	7,740
1976	72	129	2,923	8,305
1977	92	141	3,242	9,288
1978	125	153	3,561	10,896
1979	147	161	3,765	11,940
1980	143	160	3,742	11,775
1981	124	167	3,952	10,834
1982	116	163	3,846	10,440
1983	118	173	4,128	10,530
1984 1/	119	186	4,503	10,603
1985 1/	126	200	4,895	10,965
1986 1/	134	212	5,213	11,317
1987 1/	141	220	5,433	11,681
1988 1/	149	229	5,702	12,069
1989 1/	157	241	6,029	12,430
1990 1/	165	252	6,343	12,821
1991 1/	173	261	6,583	13,222
1992 1/	182	273	6,906	13,632
1993 1/	190	283	7,189	14,023

1/ Estimated by the staff of the U.S. International Trade Commission.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table L-7.--Switching equipment: U.S. exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the regression equations used in the Baseline Scenario, 1967-93

(In millions of 1983 dollars)

Year	U.S. exports	U.S. imports	Apparent consumption	World consumption 1/
1967	2/	2/	2,365	1,247
1968	7	2/	2,482	2,581
1969	38	2/	2,521	3,601
1970	58	2/	2,505	4,249
1971	51	2/	2,548	4,032
1972	92	2/	2,717	5,375
1973	129	3	2,828	6,572
1974	154	2	2,798	7,374
1975	141	1	2,776	6,944
1976	182	7	2,902	8,283
1977	253	13	2,985	10,612
1978	370	19	3,029	14,423
1979	446	23	3,056	16,896
1980	434	22	3,056	16,503
1981	365	25	3,211	14,275
1982	337	24	3,188	13,342
1983	343	28	3,311	13,555
1984 1/	349	35	3,478	13,728
1985 1/	375	41	3,634	14,585
1986 1/	400	47	3,756	15,418
1987 1/	427	51	3,834	16,281
1988 1/	455	55	3,932	17,200
1989 1/	481	61	4,059	18,057
1990 1/	510	66	4,178	18,983
1991 1/	539	71	4,262	19,932
1992 1/	569	76	4,383	20,904
1993 1/	597	81	4,488	21,839

1/ Estimated by the staff of the U.S. International Trade Commission.
2/ Less than 0.5 million 1983 dollars.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table L-8.--Customer premises equipment: U.S. exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the regression equations used in the Baseline Scenario, 1967-93

(In millions of 1983 dollars)

Year	U.S. exports	U.S. imports	Apparent consumption	World consumption 1/
1967	77	2/	3,063	10,812
1968	120	2/	3,631	11,555
1969	154	26	3,872	12,123
1970	175	28	3,867	12,484
1971	168	45	4,013	12,363
1972	213	147	4,786	13,111
1973	252	220	5,321	13,778
1974	278	217	5,273	14,225
1975	264	200	5,149	13,985
1976	308	281	5,753	14,731
1977	385	356	6,277	16,029
1978	511	435	6,776	18,151
1979	592	485	7,095	19,529
1980	579	479	7,061	19,310
1981	506	521	7,471	18,069
1982	475	496	7,300	17,550
1983	482	559	7,797	17,668
1984 1/	479	643	8,459	17,765
1985 1/	516	732	9,138	18,242
1986 1/	544	804	9,688	18,706
1987 1/	572	855	10,062	19,187
1988 1/	602	916	10,523	19,699
1989 1/	631	991	11,089	20,176
1990 1/	661	1,063	11,630	20,692
1991 1/	692	1,118	12,038	21,220
1992 1/	724	1,191	12,594	21,762
1993 1/	755	1,256	13,080	22,276

1/ Estimated by the staff of U.S. the International Trade Commission.
2/ Not available.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table L-9.--Cable, wire, and lightguide: U.S. exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the regression equations used in the Baseline Scenario, 1967-93

(In millions of 1983 dollars)

Year	U.S. exports	U.S. imports	Apparent consumption	World consumption 1/
1967	17	2/	766	2,000
1968	29	2/	889	2,570
1969	39	2/	941	3,005
1970	45	2/	938	3,282
1971	43	2/	971	3,189
1972	56	5	1,139	3,763
1973	67	9	1,255	4,274
1974	74	9	1,243	4,616
1975	70	8	1,216	4,432
1976	83	13	1,347	5,004
1977	105	18	1,458	5,999
1978	140	23	1,561	7,625
1979	163	26	1,627	8,681
1980	160	26	1,620	8,514
1981	139	29	1,715	7,562
1982	130	27	1,679	7,164
1983	132	31	1,789	7,255
1984 1/	134	37	1,935	7,329
1985 1/	142	42	2,084	7,695
1986 1/	148	47	2,204	8,050
1987 1/	158	50	2,285	8,419
1988 1/	166	54	2,385	8,811
1989 1/	174	59	2,508	9,177
1990 1/	183	64	2,626	9,572
1991 1/	199	67	2,714	9,977
1992 1/	201	77	2,835	10,392
1993 1/	210	76	2,941	10,788

1/ Estimated by the staff of the U.S. International Trade Commission.
2/ Less than 0.5 million 1983 dollars.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table L-10.--Telecommunications equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, 1983-93

(In millions of 1983 dollars)

Item	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Transmission equipment:											
U.S. producers' shipments	4,970	5,466	6,012	6,636	6,637	6,638	6,640	6,641	6,642	6,643	6,644
U.S. exports	148	163	179	198	198	198	198	198	198	198	198
U.S. imports	332	365	402	444	444	444	444	444	444	444	444
Apparent U.S. consumption	5,154	5,668	6,235	6,882	6,883	6,884	6,886	6,887	6,888	6,889	6,890
Switching apparatus:											
U.S. producers' shipments	3,593	4,274	5,087	6,076	5,832	5,599	5,374	5,160	4,953	4,756	4,566
U.S. exports	534	635	756	903	867	832	798	767	736	707	679
U.S. imports	28	33	39	46	45	43	41	39	38	36	35
Apparent U.S. consumption	3,087	3,672	4,370	5,219	5,010	4,810	4,617	4,432	4,255	4,085	3,922
Customer premises equipment:											
U.S. producers' shipments	7,392	6,428	5,595	4,931	5,125	5,325	5,533	5,749	5,981	6,214	6,457
U.S. exports	495	428	375	330	343	357	371	385	401	416	433
U.S. imports	1,582	1,377	1,198	1,055	1,097	1,140	1,184	1,230	1,280	1,330	1,382
Apparent U.S. consumption	8,479	7,377	6,418	5,656	5,879	6,108	6,346	6,594	6,860	7,128	7,406
Cable, wire, and lightguide:											
U.S. producers' shipments	1,879	1,785	1,696	1,597	1,567	1,537	1,506	1,475	1,460	1,430	1,402
U.S. exports	165	156	149	140	137	135	132	129	128	125	123
U.S. imports	49	46	44	41	41	40	39	38	38	37	37
Apparent U.S. consumption	1,763	1,675	1,591	1,498	1,471	1,442	1,413	1,384	1,370	1,342	1,316
Total:											
U.S. producers' shipments	17,834	17,953	18,390	19,240	19,161	19,099	19,053	19,025	19,036	19,043	19,069
U.S. exports	1,342	1,382	1,459	1,570	1,545	1,522	1,499	1,479	1,463	1,446	1,433
U.S. imports	1,990	1,821	1,683	1,586	1,627	1,667	1,708	1,751	1,800	1,847	1,898
Apparent U.S. consumption	18,482	18,392	18,614	19,256	19,243	19,244	19,262	19,297	19,373	19,444	19,534

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table L-11.--Total telecommunications equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the Open Market Scenario, 1967-93

Year	Producers' shipments	Exports	Imports	Apparent consumption	World consumption 1/	Ratio of--	
						Imports to U.S. consumption	Exports to producers' shipments
	Million 1983 dollars					Percent	
1967	9,672	178	80	9,574	2/	0.8	1.8
1968	9,862	188	129	9,803	2/	1.3	1.9
1969	11,433	280	106	11,258	2/	.9	2.5
1970	12,571	299	151	12,423	2/	1.2	2.4
1971	12,451	278	205	12,379	2/	1.7	2.2
1972	13,006	268	222	12,961	37,847	1.7	2.1
1973	14,350	326	317	14,341	46,347	2.2	2.3
1974	14,288	496	385	14,178	45,825	2.7	3.5
1975	10,634	558	256	10,332	36,058	2.5	5.2
1976	10,515	615	186	10,086	34,914	1.8	5.9
1977	13,670	761	246	13,155	42,175	1.9	5.6
1978	14,894	1,001	426	14,319	49,743	3.0	6.7
1979	18,025	1,147	576	17,457	55,280	3.3	6.4
1980	18,300	1,232	872	17,939	54,437	4.9	6.7
1981	18,881	1,284	811	18,408	54,527	4.4	6.8
1982	17,591	1,425	1,106	17,271	53,839	6.4	8.1
1983	17,834	1,342	1,990	18,483	54,463	10.8	7.5
1984 1/	19,512	1,435	2,220	20,297	59,591	10.9	7.4
1985 1/	20,854	1,536	2,516	21,833	64,734	11.5	7.4
1986 1/	22,377	1,651	2,619	23,345	69,545	11.2	7.4
1987 1/	23,941	1,751	2,747	24,937	75,687	11.0	7.3
1988 1/	25,976	1,845	3,226	27,357	82,287	11.8	7.1
1989 1/	28,143	1,955	3,596	29,784	88,634	12.1	6.9
1990 1/	30,458	2,091	3,953	32,307	96,307	12.2	6.9
1991 1/	32,928	2,196	4,426	35,158	104,458	12.6	6.7
1992 1/	35,437	2,325	4,937	38,049	113,199	13.0	6.6
1993 1/	38,349	2,467	5,428	41,310	123,310	13.1	6.4

1/ Estimated by the staff of the U.S. International Trade Commission.
2/ Not available.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table L-12.--Transmission equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the Open Market Scenario, 1967-93

Year	Producers' shipments	Exports	Imports	Apparent consumption	World consumption 1/	Ratio of--	
						Imports to U.S. consumption	Exports to producers' shipments
	Million 1983 dollars					Percent	
1967	1,817	19	49	1,847	2/	2.7	1.1
1968	1,930	22	79	1,988	2/	4.0	1.1
1969	2,036	25	66	2,078	2/	3.2	1.2
1970	2,030	30	92	2,091	2/	4.4	1.5
1971	1,912	29	124	2,007	2/	6.2	1.5
1972	2,030	33	135	2,132	7,155	6.3	1.6
1973	2,138	41	187	2,284	8,548	8.2	1.9
1974	2,146	64	223	2,305	8,409	9.7	3.0
1975	1,833	65	70	1,837	6,802	3.8	3.5
1976	1,884	79	62	1,867	6,859	3.3	4.2
1977	2,384	89	75	2,369	8,359	3.1	3.7
1978	2,631	104	95	2,622	10,503	3.6	3.9
1979	3,192	124	103	3,171	11,024	3.3	3.9
1980	3,785	124	115	3,777	10,737	3.0	3.3
1981	4,643	142	122	4,623	11,727	2.6	3.1
1982	4,891	152	202	4,941	12,041	4.1	3.1
1983	4,970	148	332	5,154	12,166	6.4	3.0
1984 1/	5,367	160	352	5,559	13,253	6.3	3.0
1985 1/	5,739	173	394	5,959	14,260	6.6	3.0
1986 1/	6,209	186	407	6,430	15,330	6.3	3.0
1987 1/	6,596	199	432	6,829	17,029	6.3	3.0
1988 1/	7,318	215	525	7,628	18,158	6.9	2.9
1989 1/	8,043	230	578	8,391	18,891	6.9	2.9
1990 1/	8,739	248	655	9,146	20,246	7.2	2.8
1991 1/	9,536	266	745	10,015	21,815	7.4	2.8
1992 1/	10,267	285	834	10,816	23,566	7.7	2.8
1993 1/	11,057	310	934	11,681	25,381	8.0	2.8

1/ Estimated by the staff of the U.S. International Trade Commission.
2/ Not available.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table L-13.--Switching equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the Open Market Scenario, 1967-93

Year	Producers' shipments	Exports	Imports	Apparent consumption	World consumption 1/	Ratio of--	
						Imports to U.S. consumption	Exports to producers' shipments
	Million 1983 dollars					Percent	
1967	1,915	30	2/	1,886	3/	3/	1.5
1968	2,076	32	2/	2,044	3/	3/	1.5
1969	2,553	41	2/	2,512	3/	3/	1.6
1970	2,947	56	2/	2,891	3/	3/	1.9
1971	3,162	76	2/	3,086	3/	3/	2.4
1972	3,008	47	2/	2,961	10,103	3/	1.5
1973	3,262	58	2/	3,204	12,377	3/	1.8
1974	3,495	78	2/	3,417	12,235	3/	2.2
1975	2,756	100	2/	2,656	9,413	3/	3.6
1976	2,666	131	7	2,542	9,048	0.3	4.9
1977	3,571	147	9	3,432	11,229	.3	4.1
1978	3,783	286	17	3,514	12,819	.5	7.6
1979	4,323	328	32	4,027	14,522	0.8	7.6
1980	4,268	385	35	3,919	14,689	.9	9.0
1981	3,820	442	17	3,396	14,205	.5	11.5
1982	3,497	571	18	2,945	13,856	.6	16.3
1983	3,593	534	28	3,086	13,751	.9	14.9
1984 1/	3,949	580	31	3,400	15,000	.9	14.7
1985 1/	4,231	625	44	3,650	16,400	1.2	14.8
1986 1/	4,530	685	55	3,900	17,400	1.4	15.1
1987 1/	4,770	720	50	4,100	18,600	1.2	15.1
1988 1/	4,999	755	56	4,300	20,100	1.3	15.1
1989 1/	5,326	795	69	4,600	21,700	1.5	14.9
1990 1/	5,662	840	78	4,900	23,550	1.6	14.8
1991 1/	6,095	885	90	5,300	25,400	1.7	14.5
1992 1/	6,522	930	108	5,700	27,600	1.9	14.3
1993 1/	7,061	985	124	6,200	29,900	2.0	13.9

1/ Estimated by the staff of the U.S. International Trade Commission.
2/ Less than 0.5 million 1983 dollars.
3/ Not available.

Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table L-14.--Customer premises equipment: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the Open Market Scenario, 1967-93

Year	Producers' shipments	Exports	Imports	Apparent consumption	World consumption 1/	Ratio of--	
						Imports to U.S. consumption	Exports to producers' shipments
	Million 1983 dollars					Percent	
1967	3,587	108	31	3,511	2/	0.8	3.0
1968	3,724	103	50	3,671	2/	1.4	2.8
1969	4,410	190	40	4,259	2/	.9	4.3
1970	4,833	171	60	4,721	2/	1.2	3.5
1971	4,725	143	81	4,663	2/	1.7	3.0
1972	5,118	155	88	5,051	12,881	1.7	3.0
1973	5,630	176	128	5,581	15,753	2.3	3.1
1974	5,599	262	160	5,497	15,969	2.9	4.7
1975	4,281	296	184	4,169	13,022	4.4	6.9
1976	4,057	340	110	3,827	12,101	2.9	8.4
1977	5,404	387	155	5,172	14,202	3.0	7.2
1978	6,192	450	306	6,048	16,372	5.1	7.3
1979	7,633	539	425	7,520	19,004	5.7	7.1
1980	7,834	568	511	7,776	19,279	6.6	7.3
1981	8,066	564	633	8,136	19,101	7.8	7.0
1982	7,288	567	844	7,565	18,815	11.2	7.7
1983	7,392	495	1,582	8,479	19,638	18.7	6.7
1984 1/	8,168	510	1,780	9,438	21,638	18.9	6.2
1985 1/	8,693	535	2,016	10,174	23,574	19.8	6.2
1986 1/	9,286	560	2,089	10,815	25,515	19.3	6.0
1987 1/	10,063	595	2,190	11,658	27,858	18.8	5.9
1988 1/	10,987	620	2,562	12,929	30,729	19.8	5.6
1989 1/	11,893	660	2,860	14,093	33,543	20.3	5.5
1990 1/	12,958	715	3,118	15,361	36,711	20.3	5.5
1991 1/	14,007	740	3,476	16,743	40,143	20.8	5.3
1992 1/	15,153	790	3,870	18,233	43,533	21.2	5.2
1993 1/	16,524	825	4,230	19,929	47,529	21.2	5.0

1/ Estimated by the staff of the U.S. International Trade Commission.
2/ Not available.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table L-15.--Cable, wire, and lightguide: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, apparent consumption, and world consumption, based on the Open Market Scenario, 1967-93

Year	Producers' shipments	Exports	Imports	Apparent consumption	World consumption 1/	Ratio of--	
						Imports to U.S. consumption	Exports to producers' shipments
	Million 1983 dollars					Percent	
1967	2,389	59	2/	2,330	3/	3/	2.4
1968	2,184	83	2/	2,100	3/	3/	3.8
1969	2,473	64	2/	2,410	3/	3/	2.6
1970	2,842	103	2/	2,739	3/	3/	3.6
1971	2,695	73	2/	2,622	3/	3/	2.7
1972	2,895	79	2/	2,816	7,708	3/	2.7
1973	3,380	112	4	3,272	9,669	0.1	3.3
1974	3,145	192	6	2,959	9,212	.2	6.1
1975	1,828	161	4	1,671	6,821	.2	8.8
1976	1,935	95	9	1,850	6,905	.5	4.9
1977	2,371	199	10	2,182	8,385	.5	8.3
1978	2,355	231	12	2,136	10,049	.6	9.8
1979	2,935	220	23	2,737	10,731	.8	7.5
1980	2,566	136	38	2,468	9,732	1.5	5.3
1981	2,366	157	44	2,253	9,494	2.0	6.6
1982	1,924	147	45	1,822	9,127	2.5	7.6
1983	1,879	165	49	1,763	8,909	2.8	8.7
1984 1/	2,028	185	57	1,900	9,700	3.0	9.1
1985 1/	2,191	203	62	2,050	10,500	3.0	9.3
1986 1/	2,352	220	68	2,200	11,300	3.1	9.4
1987 1/	2,512	237	75	2,350	12,200	3.2	9.4
1988 1/	2,672	255	83	2,500	13,300	3.3	9.5
1989 1/	2,881	270	89	2,700	14,500	3.3	9.4
1990 1/	3,099	288	102	2,900	15,800	3.5	9.3
1991 1/	3,290	305	115	3,100	17,100	3.7	9.3
1992 1/	3,495	320	125	3,300	18,500	3.8	9.2
1993 1/	3,692	332	140	3,500	20,500	4.0	9.0

1/ Estimated by the staff of the U.S. International Trade Commission.
2/ Less than 0.5 million 1983 dollars.
3/ Not available.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.