N O T I C E

THIS DOCUMENT HAS BEEN REPRODUCED FROM MICROFICHE. ALTHOUGH IT IS RECOGNIZED THAT CERTAIN PORTIONS ARE ILLEGIBLE, IT IS BEING RELEASED IN THE INTEREST OF MAKING AVAILABLE AS MUCH INFORMATION AS POSSIBLE

CR 167918

NASA REPORT NO. 1-4-W-1-T11

western union

TASK 11 REPORT
PLANNING ASSISTANCE
FOR THE
30/20 GHz PROGRAM
--
WORLDWIDE SATELLITE
MARKET DEMAND FORECAST

(NASA-CR-167918) WORLDWIDE SATELLITE MARKET DEMAND FORECAST Final Report (Western Union Telegraph Co., McLean, Va.) 124 p
HC A06/MF A01 CSCL 17B

N82-25423

Unclas
G3/32 28014

NASA REPORT NO. 1-4-W-1-T11

TASK 11 REPORT
PLANNING ASSISTANCE
FOR THE
30/20 GHz PROGRAM
--
WORLDWIDE SATELLITE
MARKET DEMAND FORECAST

NASA Contract No. NAS3-22461 Task 11
Lewis Research Center
21000 Brookpark Road
Cleveland, OH 44135

PREPARED BY: J.M. Bowyer
M. Frankfort
K.M. Steinnagel

The Western Union Telegraph Company
Government Systems Division
7916 Westpark Drive
McLean, VA 22102

Date: June 19, 1981

INDEX

ORIGINAL PAGE IS
OF POOR QUALITY

TASK 11 REPORT
PLANNING ASSISTANCE
FOR THE
30/20 GHz PROGRAM

WORLDWIDE SATELLITE
MARKET DEMAND FORECAST

NASA Contract No. NAS3-22461 Task 11
Lewis Research Center
21000 Brookpark Road
Cleveland, OH 44135

PREPARED BY: J.M. Bowyer
M. Frankfort
K.M. Steinnagel

The Western Union Telegraph Company
Government Systems Division
7916 Westpark Drive
McLean, VA 22102

Date: June 19, 1981

ORIGINAL PAGE IS
OF POOR QUALITY

SECTION I
INTRODUCTION

1.1 OVERVIEW OF WORLDWIDE SATELLITE MARKET FORECAST

Communications throughout the world has begun relying on satellites. The clearest example of this is Intelsat which has grown at a phenomenal rate (47%) since the first satellite was placed over the Atlantic in 1965. By the year 2000 nearly 154 nations will have an Intelsat terminal to handle international traffic. Besides this international satellite system growth, the future is very bright for domestic satellite systems. Developed countries are either planning or using satellites for heavy trunking and other wideband uses such as television. The purpose of this study is to quantify international and domestic/regional satellite communication markets with some degree of confidence.

Quantifying such dramatically developing markets, encompassing some 170 nations, proved to be a formidable task. The starting point for this study was the World Telecommunications Market Study report by Arthur D. Little. This is a comprehensive report prepared after extensive field work. It contains information on many aspects of telecommunications, one of which is satellite communications. A review of this portion of the report by NASA and Western Union lead to the conclusion that because of the dramatic changes taking place, this segment was far too conservative. For instance, direct broadcast systems were not included, however several countries have now announced intentions; U.S., Canada, Italy, France, Germany, and Japan. In addition, several countries have announced plans since the completion of the ADL study. For example, Mexico has recently announced a large domestic satellite system. They had told ADL they absolutely would not have a domestic satellite system. In addition, the Arthur D. Little study only covered the period 1980-1990 while NASA needed a projection to the year 2000. Using the Arthur D. Little report as an aide and a guide, the task was first subdivided into two major areas of concentration: the international sector; and the domestic and regional sector.

ORIGINAL PAGE IS
OF POOR QUALITY

1.2 INTERNATIONAL APPROACH

The basic approach throughout the study was to use available information to the fullest extent possible. Over 200 current trade magazine articles, numerous reports, actual plans, launch schedules and various in-house sources were examined. Long lead times are required for an extensive satellite system to be developed and implemented. Therefore, plans for the next five years for a satellite were considered to be very firm. Plans between 1985 and 1990 also should be good. After 1990 the accuracy of forecasting could be questioned, therefore in order to ensure useful planning numbers conservative but realistic approaches were taken in these cases.

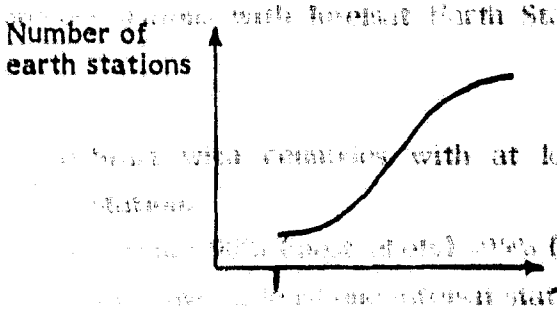
The international sector was subdivided further into the international traffic and related hardware, and leased domestic service and its related hardware. To determine the satellites required for the international use Intelsat's half circuits of traffic were projected based on historical information. Using this traffic number with the amount of traffic future satellites could handle gave the number of satellites needed. To determine the future international earth stations required, projections of past growth rates and the new countries adding an earth station were considered. Leased domestic satellites were projected using historical growth rates. It was taken into consideration that in the late 1980's and through the 1990's the growth rate will slow because of domestic and regional systems forming. Leased domestic earth stations were projected in a similar manner. Many of the earth stations initially used for leased Intelsat will be used later with a domestic or regional system.

1.3 DOMESTIC AND REGIONAL APPROACH

Historical information for Intelsat was available and accurate, thus projections could be made in most cases. However, in the case of domestic or regional systems the direct information was not available and correlations were required. It was determined information could be gathered on every country, such as GNP, population, telephones, etc. This information could then be correlated with whether a country had announced a satellite system or not. The factors with the highest correlation could then be given weights and used in a standardized weighted listing of all the countries. All values are standardized with respect to

ORIGINAL PAGE IS
OF POOR QUALITY

the world 1981 totals. Thus over time, one can see a country change relative to 1981. This resulted in a list of 75 countries that could possibly have a domestic satellite system by the year 2000. This became the basis for future satellite systems along with previously mentioned items such as announced plans, and launch schedules. Judgement also was used here, for example, South Africa will be isolated for political reasons. Once the projections of the nations which would launch satellites or participate in a regional system were made, it was relatively easy to project earth stations. The assumptions used are stated in the report and will not be repeated here, however, the basic growth curve is shown below.



Developed countries and countries which sponsor a regional system grow the fastest. The developing countries grow approximately one half as fast.

1.4 STATISTICS

All statistics throughout the report are given as both new growth and cumulative figures. Two different cases have been studied, the most likely and the optimistic. The difference between the two is that with the optimistic more domestic systems are formed as opposed to regional and these systems are implemented two to three years earlier than in the most likely case.

ORIGINAL PAGE IS
OF POOR QUALITY

SECTION II
INTELSAT

2.1 INTERNATIONAL INTELSAT -- CURRENT AND PROJECTED

2.1.1 Nations with Intelsat Earth Stations

Guidelines and Assumptions

- To forecast nations with Intelsat Earth Stations through the year 2000:
  - Start with countries with at least one intelsat earth station.
  - Assume 90% (most likely) -95% (optimistic) of the world will have at least one intelsat station by the year 2000.
  - Use a straight line growth rate to show this increase.

- Actuals and Projection - New Growth

Countries	Base 1981	1985	1990	2000	Total
ML*	108	10	13	23	154
O*	108	12	15	28	163

- Actuals and Projection - Cumulative after 1981

Countries	Base 1981	1985	1990	2000	Total
ML*	108	10	23	46	154
O*	108	12	27	55	163

ML*--Most Likely
O*--Optimistic

ORIGINAL PAGE IS
OF POOR QUALITY

2.1.2 Intelsat Earth Stations

Guidelines and Assumptions

To forecast Intelsat Earth Stations through the year 2000:

- o Start with actual numbers.
- o Look at the growth rate for A and B Stations (31% after 14 years).
- o Project outward with a range about these growth rates.
- o Traffic projections warrant a slight increase in the growth of earth stations beginning in 1990 as countries add additional nodes.
- o Assume C earth stations will operate much as an A and, therefore, can be estimated as a percent of A.
- o Assume most of the new growth in wide band earth stations will be for C stations.

  67% between 85 and 90

  80% between 91 and 2000

Actuals and Projections - New Growth

Earth Station Type	Projection Percentage	Base 1981	1985	1990	2000	Total
A	ML*	144	27	19	25	208
	O*	144	63	32	98	337
B	ML*	22	7	10	28	67
	O*	22	13	22	77	132
C	ML*	4	3	26	103	136
	O*	4	5	67	396	472

ML*--Most Likely
O*--Optimistic

ORIGINAL PAGE IS
OF POOR QUALITY

2.1.2 Intelsat Earth Stations (continued)

Projections - Cumulative after 1981

Earth Station Type	Projection Percentage	Base 1981	1985	1990	2000	Total
A	ML* (4% to 1990 then 6%)	144	27	39	64	208
	O* (8% to 1990 then 10%)	144	63	95	193	337
B	ML* (6%)	22	7	17	45	67
	O* (10%)	22	13	35	112	134
C	ML* (See notes above)	4	3	29	132	136
	O* (See notes above)	4	5	72	468	502

ML*--Most Likely
O*--Optimistic

ORIGINAL PAGE IS
OF POOR QUALITY

2.1.3 Intelsat's Half Circuits of Traffic

Guidelines and Assumptions

To forecast Intelsat half circuits through the year 2000:

- o Start with current numbers (see below).
- o Determine recent growth rates.
- o Project outward with a range about these growth rates.

Source: A Review of Intelsat Statistics

Fulltime Satellite Traffic

Year	Half Circuits	Growth Rate
1972	7500	
1973	9815	32
1974	11510	18
1975	13370	16
1976	16520	24
1977	20205	23
1978	25280	25

Average Annual Growth Rate 22-23%

Source: FSI Cross-Impact of Foreign Satellite Communications on NASA's 30/20 GHz Program

In this report FSI forecasted international traffic to grow at 15 to 17 percent per year.

Source: R.J. Rush and C. Louis Cuccia, A Projection of the Development of High Capacity Communications Satellites in the 1980's

ORIGINAL PAGE IS
OF POOR QUALITY

2.1.3 Intelsat's Half Circuits of Traffic (continued)

They report

Intelsat Traffic	Average Annual Growth Rate
Last two years	23%
Last seven years	24%
Simplex Channel Growth Rate	
1983-1993	16%

Actuals and Projections - New Growth (Thousands)

	Projection Percentage	Base 1981	1985	1990	2000	Total
Half Circuits	ML*	47	56	123	701	927
	O*	47	70	174	1209	1500

Actual and Projections - Cumulative after 1981

	Projection Percentage	Base 1981	1985	1990	2000	Total
Half Circuits	ML* (17%)	47	56	179	880	927
	O* (20%)	47	70	244	1453	1500

ML*--Most Likely
O*--Optimistic

ORIGINAL PAGE IS
OF POOR QUALITY

2.1.4 Satellite Required for International Traffic

Guidelines and Assumptions

To forecast satellites required for International Traffic through the year 2000:

- Present system operation 80% of available circuits.
- Intelsat V 1985
  - can handle 24,000 half circuits/satellites.
  - twelve V and VAs are planned before 1985.
- Intelsat VI 1990
  - can handle 80,000 half circuits/satellites.
  - will operate at 70% of available circuits.
- Intelsat VII
  - can handle 120,000 half circuits/satellites.
  - will operate at 70% of available circuits.

Actual and Projections - New Growth

	Projection Technique	Purpose	1981	1985	1990	2000	Total
Satellites	ML*	Primary	5	6	5	10	26
		Spare	5	3	3	3	14
		Total	10	9	8	13	40
	O*	Primary	5	7	7	16	35
		Spare	5	2	4	4	15
		Total	10	9	11	20	50

ML*--Most Likely
O*--Optimistic

ORIGINAL PAGE IS
OF POOR QUALITY

2.1.4 Satellites Required for International Traffic (continued)

Actual and Projections - Cumulative after 1981

	Projection Technique	Purpose	1981	1985	1990	2000	Total
Satellites	ML*	Primary	5	6	11	21	26
		Spare	5	3	6	9	14
		Total	10	9	17	30	40
	O*	Primary	5	7	14	30	35
		Spare	5	2	6	10	15
		Total	10	9	20	40	50

ML*--Most Likely
O*--Optimistic

ORIGINAL PAGE IS
OF POOR QUALITY

2.2 LEASED DOMESTIC INTELSAT

2.2.1 Leased Transponders

Guidelines and Assumptions

To forecast leased transponders through the year 2000:

- o Start with actual numbers.
- o Determine the present growth rate (71% over last 7 years).
- o Project outward considering regional and domestic systems will slow down the pace.

Actuals and Projections -- New Growth

	Projection Technique	Base 1981	1985	1990	2000	Total
Leased Transponders	ML* (30% thru 85 then 10%)	16	43	36	151	246
	O* (40% thru 85 then 15%)	16	70	86	527	699

Actuals and Projections -- Cumulative after 1981

	Projection Technique	Base 1981	1985	1990	2000	Total
Leased Transponders	ML* (30% thru 85 then 10%)	16	43	79	230	246
	O* (40% thru 85 then 15%)	16	70	156	683	699

ML*--Most Likely
O*--Optimistic

ORIGINAL PAGE IS
OF POOR QUALITY

2.2.2 Satellites Required For Leased Domestic Service

Guidelines and Assumptions

To forecast satellites required:

- o Intelsat V 1985 - will have 27 bandwidth equivalent 36 megahertz transponders
  - twelve V and VAs are planned before 1985
- o Intelsat VI 1990 - will have 72 bandwidth equivalent 36 megahertz transponders
- o Intelsat VII - will have 108 bandwidth equivalent 36 megahertz transponders
- o Leased Domestic Satellites - at least one per ocean by 1985.

Actuals and Projections -- New Growth

	Projection Technique	1981	1985	1990	2000	Total
Satellites	ML*	2	3	3	4	12
	O*	2	3	3	7	15

Actuals and Projections -- Cumulative after 1981

	Projection Technique	Base 1981	1985	1990	2000	Total
Satellites	ML*	2	3	6	10	12
	O*	2	3	6	13	15

ML*--Most Likely
O*--Optimistic

ORIGINAL PAGE IS
OF POOR QUALITY

2.2.3 Domestic Non-Standard Earth Stations for Use With Intelsat Satellite

Guidelines and Assumptions

To forecast domestic non-standard earth stations:

- o Start with actual numbers.
- o Determine the present growth rate.
- o Project outward considering regional and domestic system will slow down the pace.

Actuals and Projections -- New Growth

	Projection Technique	Base 1981	1985	1990	2000	Total
ES	ML* 20% to 85 then 10%	191	205	241	1,017	1,654
	O* 30% to 85 then 15%	191	354	551	3,338	4,434

Actuals and Projections -- Cumulative after 1981

	Projection Technique	Base 1981	1985	1990	2000	Total
ES	ML* 20% to 85 then 10%	191	205	446	1,463	1,654
	O* 30% to 85	191	354	905	4,243	4,434

ML*--Most Likely
O*--Optimistic

ORIGINAL PAGE IS
OF POOR QUALITY

2.3 INTELSAT EXPENDITURES

2.3.1 Total Expenditures

Guidelines and Assumptions

To forecast expenditures through the year 2000:

- Estimated cost per earth station 1980 dollars:
  - A - $6 million
  - B - $3 million
  - C - $3 million
  - NS - $1.5 million
- Estimated cost per satellite 1980-81 dollars:

1980-1985	Intelsat V & VA	$33 million
1985-1990	Intelsat VI	$50 million
1990-2000	Intelsat VII	$80 million

- Estimated cost to launch:

Intelsat V & VA, VI	$40 million
Intelsat VII	$70 million

Actuals and Projections -- New Growth

	Projection Technique	1981	1985	1990	2000	Total
Expenditure	A/ES ML*	864	162	72	150	1,248
	O*	864	378	192	588	2,022
	B/ES ML*	66	21	30	84	201
	O*	66	39	66	231	402
	C/ES ML*	12	9	78	309	408
	O*	12	15	201	1,188	1,416
	NS/ES ML*	287	308	362	1,526	2,483
	O*	287	531	827	5,007	6,651
	Satellites ML*	360	396	550	1,360	2,666
	O*	360	396	700	2,160	3,616
	Launch ML*	--	90	240	700	1,030
	O*	--	90	360	1,100	1,550
	TOTAL ML*	1,589	986	1,332	4,129	8,034
	O*	1,589	1,550	2,246	10,274	15,657

ML*--Most Likely
O*--Optimistic

ORIGINAL PAGE IS
OF POOR QUALITY

2.3.1 Total Expenditures (continued)

Actuals and Projections - Cumulative (Millions of 1980 Dollars)

	Projection Technique	1981	1985	1990	2000	Total
Expenditure	A/ES ML*	864	162	234	384	1,248
	O*	864	378	570	1,158	2,022
	B/ES ML*	66	21	51	135	201
	O*	66	39	105	336	402
	C/ES ML*	12	9	87	396	408
	O*	12	15	216	1,404	1,416
	NS/ES ML*	287	308	670	2,196	2,483
	O*	287	531	1,358	6,365	6,652
	Satellites ML*	360	396	946	2,306	2,666
	O*	360	396	1,096	3,256	3,616
	Launch ML*	--	90	330	1,030	1,030
	O*	--	90	450	1,550	1,550
	TOTAL ML*	1,589	986	2,318	6,447	8,036
	O*	1,589	1,550	3,795	14,069	15,658

ML*--Most Likely
O*--Optimistic

ORIGINAL PAGE IS
OF POOR QUALITY

2.3.2 Regional Earth Station Expenditures

Guidelines and Assumptions

To forecast regional expenditures through the year 2000:

- o Determine the number of A, B and NS ES with the same ratio currently in effect.
- o Determine C ES on the same percentage as A ES.
- o Assume 5% of new NS ES will be in Oceania Region in 1985 and after.

ORIGINAL PAGE IS
OF POOR QUALITY

2.3.2 Regional Earth Station Expenditures (continued)

Actuals and Projections -- New Growth

REGIONAL BREAKDOWN
MOST LIKELY CASE
(Millions 1980 Dollars)

	1981	1985	1990	2000	
A	69.6	13.0	5.8	12.1	NORTH AMERICA
B					
C	6.0	3.9	3.1	24.9	
N/S					
A	145.0	27.2	12.1	25.2	SOUTH AMERICA
B	9.0	2.9	4.1	11.5	
C			14.6	51.8	
N/S	56.6	57.9	68.0	286.7	
A	208.8	39.1	17.4	36.2	EUROPE
B	9.0	2.9	4.1	11.5	
C	6.0	3.9	17.2	74.7	
N/S	19.5	20.0	23.5	98.9	
A	133.4	25.0	11.1	23.2	AFRICA
B	30.0	9.5	13.6	38.2	
C			13.4	47.7	
N/S	132.8	135.7	159.5	672.3	
A	272.5	51.1	22.7	47.3	ASIA
B	9.0	2.9	4.1	11.5	
C		1.3	26.2	97.5	
N/S	78.1	79.8	93.8	395.5	
A	34.8	6.5	2.9	6.0	OCEANIA
B	9.0	2.9	4.1	11.5	
C			3.5	12.4	
N/S		14.7	17.2	72.7	
A	864.0	162.0	72.0	150.0	TOTAL
B	66.0	21.0	30.0	84.0	
C	12.0	9.0	78.0	309.0	
N/S	287.0	308.0	362.0	1526.0	

ORIGINAL PAGE IS
OF POOR QUALITY

2.3.2 Regional Earth Station Expenditures (continued)

Actuals and Projections -- Cumulative After 1981

REGIONAL BREAKDOWN
MOST LIKELY CASE
(Millions 1980 Dollars)

	1981	1985	1990	2000	
A	69.6	13.0	18.8	30.9	NORTH AMERICA
B					
C	6.0	3.9	7.0	31.9	
N/S					
A	145.0	27.2	39.3	64.4	SOUTH AMERICA
B	9.0	2.9	7.0	18.4	
C			14.6	66.4	
N/S	56.6	57.9	125.9	412.6	
A	208.8	39.1	56.5	92.8	EUROPE
B	9.0	2.9	7.0	18.4	
C	6.0	3.9	21.0	95.7	
N/S	19.5	20.0	43.4	142.3	
A	133.4	25.0	36.1	59.3	AFRICA
B	30.0	9.5	23.2	61.4	
C			13.4	61.1	
N/S	132.8	135.7	295.2	967.5	
A	272.5	51.1	73.8	121.1	ASIA
B	9.0	2.9	7.0	18.4	
C		1.3	27.4	124.9	
N/S	78.1	79.8	173.6	569.1	
A	34.8	6.5	9.4	15.5	OCEANIA
B	9.0	2.9	7.0	18.4	
C			3.5	15.9	
N/S		14.7	31.9	104.6	
A	864.0	162.0	234.0	384.0	TOTAL
B	66.0	21.0	51.0	135.0	
C	12.0	9.0	87.0	396.0	
N/S	287.0	308.0	670.0	2196.0	

ORIGINAL PAGE IS
OF POOR QUALITY

2.3.2 Regional Earth Station Expenditures (continued)

Actuals and Projections -- New Growth

REGIONAL BREAKDOWN
OPTIMISTIC CASE
(Millions 1980 Dollars)

	1981	1985	1990	2000	
A	69.6	30.4	15.5	47.4	NORTH AMERICA
B					
C	6.0	5.0	12.4	95.7	
N/S					
A	145.0	63.4	32.2	98.7	SOUTH AMERICA
B	9.0	5.3	9.0	31.5	
C			36.2	199.3	
N/S	56.6	99.8	155.4	940.7	
A	208.8	91.3	46.4	142.1	EUROPE
B	9.0	5.3	9.0	31.5	
C	6.0	8.3	43.9	287.0	
N/S	19.5	34.4	53.6	324.4	
A	133.4	58.3	29.6	90.8	AFRICA
B	30.0	17.7	30.0	105.0	
C			33.3	183.4	
N/S	132.8	233.9	364.3	2205.9	
A	272.5	119.2	60.6	185.5	ASIA
B	9.0	5.3	9.0	31.5	
C		1.7	66.5	374.7	
N/S	78.1	137.6	214.3	1297.6	
A	34.8	15.2	7.7	23.7	OCEANIA
B	9.0	5.3	9.0	31.5	
C			8.7	47.8	
N/S		25.3	39.4	238.4	
A	864.0	378.0	192.0	588.0	TOTAL
B	66.0	39.0	66.0	231.0	
C	12.0	15.0	201.0	1188.0	
N/S	287.0	531.0	827.0	5007.0	

ORIGINAL PAGE IS
OF POOR QUALITY

2.3.2 Regional Earth Station Expenditures (continued)

Actuals and Projections -- Cumulative After 1981

REGIONAL BREAKDOWN
OPTIMISTIC CASE
(Millions 1980 Dollars)

	1981	1985	1990	2000	
A	69.6	30.4	45.9	93.3	NORTH AMERICA
B					
C	6.0	5.0	17.4	113.1	
N/S					
A	145.0	63.4	95.6	194.3	SOUTH AMERICA
B	9.0	5.3	14.3	45.8	
C			36.2	235.6	
N/S	56.6	99.8	255.1	1195.9	
A	208.8	91.3	137.7	279.8	EUROPE
B	9.0	5.3	14.3	45.8	
C	6.0	8.3	52.2	339.2	
N/S	19.5	34.4	88.0	412.4	
A	133.4	58.3	88.0	178.8	AFRICA
B	30.0	17.7	47.7	152.7	
C			33.3	216.7	
N/S	132.8	233.9	598.3	2804.1	
A	272.5	119.2	179.8	365.3	ASIA
B	9.0	5.3	14.3	45.8	
C		1.7	68.1	442.9	
N/S	78.1	137.6	351.9	1649.5	
A	34.8	15.2	23.0	46.6	OCEANIA
B	9.0	5.3	14.3	45.8	
C			8.7	56.5	
N/S		25.3	64.7	303.1	
A	864.0	378.0	570.0	1158.0	TOTAL
B	66.0	39.0	105.0	336.0	
C	12.0	15.0	216.0	1404.0	
N/S	287.0	531.0	1358.0	6365.0	

SECTION III
DOMESTIC AND REGIONAL SATELLITE SYSTEMS

3.1 COUNTRIES CONSIDERED

See the computer printout pages that follow.

ORIGINAL PAGE IS
OF POOR QUALITY

NORTH AMERICA

1 BAHAMAS
2 BERMUDA
3 CANADA
4 UNITED STATES

ORIGINAL PAGE IS
OF POOR QUALITY

SOUTH AMERICA

1 ARGENTINA
2 BARBADOS
3 BELIZE
4 BOLIVIA
5 BRAZIL
6 CHILE
7 COLOMBIA
8 COSTA RICA
9 CUBA
10 DOMINICA
11 DOMINICAN REPUBLIC
12 ECUADOR
13 EL SALVADOR
14 FRENCH GUINEA
15 GRENADA
16 GUATEMALA
17 GUYANA
18 HAITI
19 HONDURAS
20 JAMAICA
21 MARTINIQUE
22 MEXICO
23 NICARAGUA
24 PANAMA
25 PARAGUAY
26 PERU
27 ST LUCIA
28 ST VINCENT
29 SURINAME
30 TRINIDAD AND TOBAGO
31 URAGUAY
32 VENEZUALA

ORIGINAL PAGE IS
OF POOR QUALITY

EUROPE

1 ALBANIA
2 ANDORRA
3 AUSTRIA
4 BELGIUM
5 BULGARIA
6 CZECHOSLOVAKIA
7 DENMARK
8 EAST GERMANY
9 FINLAND
10 FRANCE
11 GREECE
12 GREENLAND
13 HUNGARY
14 ICELAND
15 IRELAND
16 ITALY
17 LICHTENSTEIN
18 LUXEMBOURG
19 MALTA
20 MONACO
21 NETHERLANDS
22 NORWAY
23 POLAND
24 PORTUGAL
25 ROMANIA
26 SAN MARINO
27 SPAIN
28 SWEDEN
29 SWITZERLAND
30 UNITED KINGDOM
31 WEST GERMANY
32 YUGOSLAVIA

ORIGINAL PAGE IS
OF POOR QUALITY

AFRICA

1 ALGERIA
2 ANGOLA
3 BENIN
4 BOTSWANA
5 BURUNDI
6 CAMEROON
7 CAPE VERDE
8 CENTRAL AFRICAN REPUBLIC
9 CHAD
10 COMOROS
11 CONGO
12 DJIBOUTI
13 EGYPT
14 EQUATORIAL GUINEA
15 ETHIOPIA
16 GABON
17 GAMBIA
18 GHANA
19 GUINEA
20 GUINEA BISSAU
21 IVORY COAST
22 KENYA
23 LESOTHO
24 LIBERIA
25 LIBYA
26 MALAGASY REPUBLIC
27 MALAWI
28 MALI
29 MAURITANIA
30 MAURITIUS
31 MOROCCO
32 MOZAMBIQUE
33 NAMIBIA
34 NIGER
35 NIGERIA
36 RWANDA
37 SAO TOME AND PRINCIPE
38 SENEGAL
39 SEYCHELLES
40 SIERRA LEONE
41 SOMALIA
42 SOUTH AFRICA
43 SUDAN
44 SWAZILAND
45 TANZANIA
46 TOGO
47 TUNISIA
48 UGANDA
49 UPPER VOLTA
50 ZAIRE
51 ZAMBIA
52 ZIMBABWE

ORIGINAL PAGE IS
OF POOR QUALITY

ASIA

1. AFGHANISTAN
2 BAHRAIN
3 BANGLADESH
4 BHUTAN
5 BURMA
6 CAMBODIA
7 CHINA
8 CYPRUS
9 HONG KONG
10 INDIA
11 INDONESIA
12 IRAN
13 IRAQ
14 ISRAEL
15 JAPAN
16 JORDAN
17 KHMER REPUBLIC
18 KUWAIT
19 LAOS
20 LEBANON
21 MALAYASIA
22 MALDIVES
23 MONGOLIA
24 NEPAL
25 NORTH KOREA
26 OMAN
27 PAKISTAN
28 PHILLIPINES
29 QATAR
30 SAUDI ARABIA
31 SIKKIM
32 SINGAPORE
33 SOUTH KOREA
34 SOVIET UNION
35 SRI LANKA
36 SYRIA
37 TAIWAN
38 THAILAND
39 TURKEY
40 UNITED ARAB EMIRATES
41 VIET NAM
42 YEMEN ARAB REPUBLIC
43 YEMEN DEMOCRATIC REPUBLIC

ORIGINAL PAGE IS
OF POOR QUALITY

OCEANIA

1 AUSTRALIA
2 FIJI
3 FRENCH POLYNESIA
4 KIRIBATI
5 NAURU
6 NEW ZEALAND
7 PAPUA NEW GUINEA
8 SOLOMON ISLANDS
9 TONGA
10 TUVALU
11 VANUATU
12 WESTERN SAMOA

ORIGINAL PAGE IS
OF POOR QUALITY

3.2 FACTORS CONSIDERED

- Square Miles of Land
- Number of Large Cities
- Number of Medium Cities
- Number of Small Cities
- Total Population
- Number of Miles of Microwave Transmission
- Total Telecommunication Market in 1980-1981 Dollars
- Number of Telephones
- Number of Television Receivers
- Number of Radio Receivers
- Number of Telegrams Domestic
- Number of Telegrams Foreign
- GNP in 1980-1980 Dollars

ORIGINAL PAGE IS
OF POOR QUALITY

3.3 FACTORS USED AND WEIGHTS

Factor	Weight (%)
GNP	20
Population	10
Square Miles	20
Equivalent Medium Size Cities*	15
Telecommunication Market	10
Telephones	15
Radio Receivers	5
Television Receivers	5

How Determined

1. Correlation
   a. Demographic Factors
   b. Communication Market Factors
2. Judgment
   a. Domestic Political Factors
   b. Geography Factors
   c. Climate Factors
   d. International Political Factors

* Equivalent Medium Size Cities are derived by algorithm from large cities and added to as medium size cities.
(Lavg/Mavg)(#L) + #M = equivalent number of medium size cities.
Lavg = average population of a large city of a specific country.
Mavg = average population of a medium size city of a specific country.
#L = the number of large cities.
#M = the number of medium size cities.

ORIGINAL PAGE IS
OF POOR QUALITY

3.4 RANKING OF COUNTRIES

The computer printouts that follow are in a sequence of weighted standardized rankings for potential domestic/regional satellite systems.

ORIGINAL PAGE IS
OF POOR QUALITY

WEIGHTED STANDARDIZED RANKINGS FOR POTENTIAL DOMESTIC/REGIONAL SATELLITE SYSTEMS

	COUNTRY	1981	DOM SYS	LAUNCH DATE	REG SYS	1985	1990	2000
1	UNITED STATES	0.218	*	1975		0.251	0.302	0.454
2	SOVIET UNION	0.120	*			0.139	0.171	0.286
3	JAPAN	0.076	*	1978		0.096	0.133	0.307
4	CHINA	0.056	*	1983		0.059	0.065	0.081
5	WEST GERMANY	0.039	*	1985	4	0.044	0.052	0.074
6	CANADA	0.037	*	1972		0.040	0.044	0.058
7	INDIA	0.035	*	1982		0.037	0.040	0.048
8	BRAZIL	0.035	*	1985	2	0.040	0.048	0.083
9	FRANCE	0.035	*	1983	4	0.041	0.052	0.092
10	UNITED KINGDOM	0.030			4	0.034	0.042	0.064
11	AUSTRALIA	0.025	*	1985	8	0.027	0.029	0.036
12	ITALY	0.024	*		5	0.028	0.034	0.053
13	SPAIN	0.016			4	0.020	0.026	0.052
14	MEXICO	0.014	*	1985	1	0.017	0.021	0.041
15	ARGENTINA	0.013			2	0.015	0.019	0.046
16	INDONESIA	0.011	*	1976	7	0.012	0.014	0.020
17	POLAND	0.009			40	0.012	0.015	0.028
18	NETHERLANDS	0.009				0.010	0.012	0.019
19	TURKEY	0.008			5	0.010	0.012	0.023
20	NIGERIA	0.008			10	0.009	0.010	0.017
21	IRAN	0.008	*	1982	6	0.008	0.009	0.013
22	SAUDI ARABIA	0.007			6	0.009	0.011	0.026
23	SOUTH KOREA	0.007			7	0.010	0.015	0.044
24	ALGERIA	0.007			6	0.008	0.009	0.014
25	SWEDEN	0.007			3	0.007	0.008	0.010
26	EGYPT	0.007				0.007	0.007	0.008
27	BELGIUM	0.007			4	0.008	0.009	0.013
28	PAKISTAN	0.007				0.007	0.008	0.010
29	SWITZERLAND	0.006			4	0.007	0.007	0.009
30	EAST GERMANY	0.006			40	0.007	0.008	0.012
31	COLOMBIA	0.006	*	1987	1	0.007	0.008	0.012
32	YUGOSLAVIA	0.006			40	0.007	0.010	0.020
33	ZAIRE	0.006				0.006	0.006	0.006
34	SUDAN	0.006			6	0.006	0.006	0.006
35	ROMANIA	0.005			40	0.007	0.010	0.023
36	CZECHOSLOVAKIA	0.005			40	0.006	0.007	0.010
37	SOUTH AFRICA	0.005				0.006	0.006	0.007
38	PHILLIPINES	0.005			7	0.006	0.007	0.010
39	VENEZUALA	0.005			1	0.006	0.007	0.011
40	THAILAND	0.005			7	0.006	0.007	0.014
41	NORWAY	0.005			3	0.006	0.008	0.016
42	PERU	0.005			1	0.005	0.005	0.006
43	FINLAND	0.004			3	0.005	0.006	0.009
44	BANGLADESH	0.004				0.004	0.005	0.006
45	DENMARK	0.004			3	0.004	0.005	0.008
46	AUSTRIA	0.004			5	0.004	0.005	0.009
47	GREECE	0.004				0.005	0.006	0.015
48	CHILE	0.003			1	0.004	0.004	0.004
49	HUNGARY	0.003			40	0.004	0.005	0.008
50	BURMA	0.003				0.003	0.003	0.004

ORIGINAL PAGE IS
OF POOR QUALITY

WEIGHTED STANDARDIZED RANKINGS
FOR POTENTIAL DOMESTIC/REGIONAL SATELLITE SYSTEMS

	COUNTRY	1981	DOM SYS	LAUNCH DATE	REG SYS	1985	1990	2000
51	NORTH KOREA	0.003				0.004	0.006	0.021
52	BULGARIA	0.003				0.003	0.004	0.007
53	TANZANIA	0.003				0.003	0.003	0.004
54	MALAYASIA	0.003			7	0.003	0.004	0.008
55	IRAQ	0.003			6	0.003	0.004	0.006
56	MOROCCO	0.002			6	0.003	0.003	0.004
57	AFGHANISTAN	0.002			40	0.002	0.002	0.002
58	NEW ZEALAND	0.002			8	0.003	0.003	0.004
59	PORTUGAL	0.002			4	0.003	0.003	0.005
60	KENYA	0.002			10	0.002	0.002	0.003
61	ISRAEL	0.002				0.002	0.003	0.004
62	CUBA	0.002				0.002	0.002	0.003
63	TAIWAN	0.002				0.002	0.002	0.003
64	ECUADOR	0.002			1	0.002	0.003	0.005
65	URAGUAY	0.001			2	0.001	0.002	0.002
66	IVORY COAST	0.001			4	0.002	0.002	0.003
67	SYRIA	0.001			6	0.001	0.002	0.002
68	GUATEMALA	0.001				0.001	0.001	0.002
69	IRELAND	0.001				0.001	0.001	0.002
70	TUNISIA	0.001			6	0.001	0.001	0.002
71	UNITED ARAB EMIRATES	0.001			6	0.001	0.001	0.002
72	SINGAPORE	0.001			7	0.001	0.002	0.004
73	DOMINICAN REPUBLIC	0.001				0.001	0.001	0.002
74	KUWAIT	0.001			6	0.001	0.001	0.003
75	LUXEMBOURG	0.000			4	0.000	0.000	0.001

ORIGINAL PAGE IS
OF POOR QUALITY

3.5 DETERMINATION OF PROBABLE NEW SYSTEMS

Non-U.S. Market

1. Systems up to 1985:

   - o ITU Schedules
   - o Announced Plans
   - o Launch Schedules
   - o Arthur D. Little

2. Systems after 1985:

   - o Announced Plans
   - o Trade Magazines
   - o Weighted Standardized Ranking and Change
   - o Judgment

ORIGINAL PAGE IS
OF POOR QUALITY

1. "Earth Terminal Hardware Market Growing," Telecommunications, April 1979, C.E. White.
2. "The Next Decade," Satellite Communications, January 1981, Walter Morgan.
3. "Home Satellites Terminals," Satellite Communications December 1979, Lucy Huffman.
4. "Telecommunications Growth in the 1980's," Satellite Communications, June 1980, Joseph C. Bothwell, Jr.
5. "A Forecast of Public Service Satellite Communications," Satellite Communications, July 1979, Joseph Martino.
6. "Expanding Broadband Switched Communications Networks," Satellite Communications, January 1979, David H. Staelin.
7. "Teleconferencing Enters Its Growth Stage," Telecommunications, June 1980, Walt Sonneville.
8. "Toward a New Era Satellite Communication Conference," Satellite Communications, October 1979, Stephen Shaw.
9. Satellite System Digest, Satellite System Engineering Inc.
10. Internal Services.

ORIGINAL PAGE IS
OF POOR QUALITY

3.6 SIZE OF SATELLITE

Depends on How Used

1. Direct Broadcast
2. General Purpose

How Advanced the Telecommunications Market Is

1. New Market With Few Terrestrial Connections
2. Advance Market Needing More Wideband Capacity

Whether the Satellite Will Be Domestic or Regional

ORIGINAL PAGE IS
OF POOR QUALITY

3.7 PROBABLE SATELLITE SYSTEMS

The computer printouts that follow is a list of probable domestic/ regional satellite systems.

ORIGINAL PAGE IS
OF POOR QUALITY

		REGION
CANADA	D	
MEXICO	D	
CHINA	D	
INDIA	D	
JAPAN	D	
PAKISTAN	D	
SOVIET UNION	D	
UNITED STATES	D	
MEXICO	P	1
BOLIVIA		1
CHILE		1
COLOMBIA		1
ECUADOR		1
PERU		1
VENEZUALA		1
BRAZIL	P	2
ARGENTINA		2
URAGUAY		2
DENMARK	P	3
FINLAND	P	3
ICELAND	P	3
NORWAY	P	3
SWEDEN	P	3
FRANCE	P	4
WEST GERMANY	P	4
BELGIUM		4
LUXEMBOURG		4
PORTUGAL		4
SPAIN		4
SWITZERLAND		4
UNITED KINGDOM		4
CAMEROON		4
CONGO		4
GABON		4
IVORY COAST		4
RWANDA		4
SENEGAL		4
		4
ITALY	P	5
AUSTRIA		5
TURKEY		5
ALGERIA	P	6
SAUDI ARABIA	P	6
LIBYA		6

ORIGINAL PAGE IS
OF POOR QUALITY

		REGION
MAURITANIA		6
MOROCCO		6
SUDAN		6
TUNISIA		6
BAHRAIN		6
IRAN		6
IRAQ		6
JORDAN		6
KUWAIT		6
LEBANON		6
OMAN		6
QATAR		6
SYRIA		6
UNITED ARAB EMIRATES		6
YEMEN ARAB REPUBLIC		6
INDONESIA	P	7
MALAYASIA		7
PHILLIPINES		7
SINGAPORE		7
SOUTH KOREA		7
THAILAND		7
PAPUA NEW GUINEA		7
AUSTRALIA	P	8
NEW ZEALAND		8
KENYA	P	10
NIGERIA	P	10
GHANA		10
LIBERIA		10
NIGER		10
UGANDA		10
SOVIET UNION	P	40
CZECHOSLOVAKIA		40
EAST GERMANY		40
HUNGARY		40
POLAND		40
ROMANIA		40
YUGOSLAVIA		40
AFGHANISTAN		40
TOTAL		

ORIGINAL PAGE IS
OF POOR QUALITY

		REGION
CANADA	D	
MEXICO	D	
WEST GERMANY	D	
CHINA	D	
INDIA	D	
JAPAN	D	
PAKISTAN	D	
UNITED STATES	D	
COLOMBIA	P	1
BOLIVIA		1
CHILE		1
ECUADOR		1
PERU		1
VENEZUALA		1
BRAZIL	P	2
ARGENTINA		2
URAGUAY		2
DENMARK	P	3
FINLAND	P	3
ICELAND	P	3
NORWAY	P	3
SWEDEN	P	3
PORTUGAL	P	4
SPAIN	P	4
FRANCE	P	5
BELGIUM		5
LUXEMBOURG		5
SWITZERLAND		5
UNITED KINGDOM		5
CAMEROON	P	6
CONGO		6
GABON		6
IVORY COAST		6
RWANDA		6
SENEGAL		6
TOGO		6
ITALY	P	7
AUSTRIA		7
TURKEY		7
ALGERIA	P	8
SAUDI ARABIA	P	8
LIBYA		8

ORIGINAL PAGE IS
OF POOR QUALITY

PROBABLE SATELLITE SYSTEMS - OPTIMISTIC

		REGION
MAURITANIA		8
MOROCCO		8
SUDAN		8
TUNISIA		8
BAHRAIN		8
IRAN		8
IRAQ		8
JORDAN		8
KUWAIT		8
LEBANON		8
OMAN		8
QATAR		8
SYRIA		8
UNITED ARAB EMIRATES		8
YEMEN ARAB REPUBLIC		8
INDONESIA	P	9
MALAYASIA		9
PHILLIPINES		9
SINGAPORE		9
SOUTH KOREA		9
THAILAND		9
PAPUA NEW GUINEA		9
KENYA	P	10
NIGERIA	P	10
GHANA		10
LIBERIA		10
UGANDA		10
AUSTRALIA	P	11
NEW ZEALAND		11
SOVIET UNION	P	40
CZECHOSLOVAKIA		40
EAST GERMANY		40
HUNGARY		40
POLAND		40
ROMANIA		40
YUGOSLAVIA		40
AFGHANISTAN		40
TOTAL		

ORIGINAL PAGE IS
OF POOR QUALITY

3.8 EARTH STATION ASSUMPTIONS

- Non-U.S.

  1. Main Station: Three TV and five message links
     - One per satellite major population center
     - At least two per satellite within country

  2. Regional City Station: One TV and three message links
     - One per major regional city

  3. Small City Station: One TV and one message link

  4. TV Receive Only Station: One per 20 small villages maximum
     - One per small village over 3,000

  5. Direct Broadcast Station:
     - Starts at 1 per .1% of the population
     - Grows at 20% per year
     - Upper limit is 1 per five people
     - Three stations are only used with a Direct Broadcast satellite

- U.S.

  1. Main Station
     - Heavy trunk station

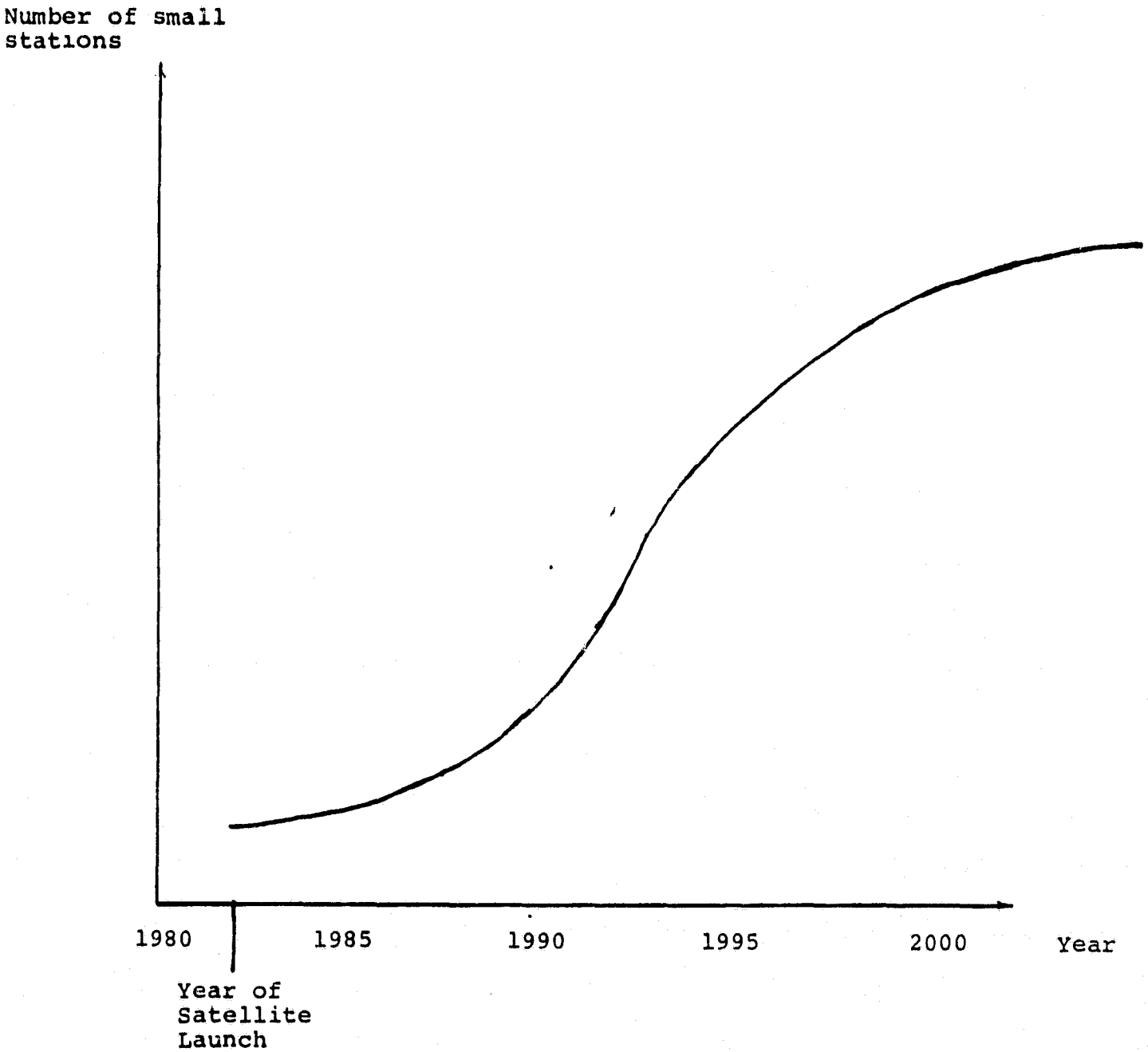
  2. Regional City Station
     - Intermediate trunk station

  3. Small City Station
     - Industrial station

  4. Direct Broadcast
     - Direct transmission to the home

ORIGINAL PAGE IS
OF POOR QUALITY

DOMESTIC & REGIONAL EARTH STATION GROWTH CURVE



ORIGINAL PAGE IS
OF POOR QUALITY

3.9 NON-HARDWARE COMPONENTS ASSUMPTIONS

- Non-U.S.

  1. Planning:
     - 50% of the initial planning for countries other than Europe, Japan and Communist systems will go the the U.S.
     - 20% of the planning will be done on systems never launched.

  2. Launch:
     - 70% of satellites launched for countries other than Europe, Japan (after 1985) and Communist systems will be launched by the U.S.

  3. Turnkey:
     - 50% of the turnkey market excluding Europe, Japan and Communist systems will be the U.S.

  4. Operation:
     - 50% of the operations market excluding Europe, Japan and Communist systems will go to the U.S.

- U.S.

  1. Planning:
     - $100K/launch

  2. Launch:
     - 100% on shuttle

  3. Turnkey:
     - price includes

  4. Operation:
     - $3 million/year for all satellites total.

ORIGINAL PAGE IS
OF POOR QUALITY

3.10 COST ESTIMATES

		Non-U.S.	U.S.
A.	A Main Station 11-12 meter 3 TV and 5 message links	1.54 M	1.54 M
B.	A Regional Station 11-12 meter 1 TV and 3 message links	1.020 M	1.02 M
C.	A Small City 10 meter 1 TV and 1 message	.500 M	.05 M
D.	A TV/RO 5 meter	.025 M	.025 M
E.	A Direct Broadcast	.0005 M	.0005 M
F.	Planning For a Satellite System (3 years)	5.00 M	
	Planning For a Launch		.10 M
G.	Launch		
	shuttle	20 M	20 M
H.	Operation Cost Per Year (First Generation)	3 M	
	Operation Cost Per Year (Total)		3 M
I.	Turnkey Earth Station ½ of Hardware Cost Added On for Non-U.S. only	--	--

ORIGINAL PAGE IS
OF POOR QUALITY

3.11 REGIONAL REPORTS

The computer printouts that follow in this Section 3.11 depict units and dollar expenditures by region for domestic/regional satellite systems.

ORIGINAL PAGE IS
OF POOR QUALITY

NORTH AMERICA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	6	4	0	0	10
	24 XP	8	14	22	63	107
	12 XP/GS	6	4	0	0	10
	24 XP/GS	8	14	22	63	107
DIRECT BROADCAST	MAIN	0	1	6	10	17
	GROUND SPARE	0	1	6	10	17
EARTH STATIONS						
MAIN		28	6	4	5	43
REGIONAL		126	38	53	121	338
SMALL		637	6423	12550	31500	51110
TV/RO		3716	11612	10223	11523	37074
DIRECT BROADCAST		0	43853	125268	4496529	4665650

ORIGINAL PAGE IS
OF POOR QUALITY

SOUTH AMERICA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0	1	0	0	1
	24 XP	0	1	0	2	3
	12 XP/GS	0	1	0	0	1
	24 XP/GS	0	1	0	2	3
DIRECT BROADCAST	MAIN	0	0	0	1	1
	GROUND SPARE	0	0	0	1	1
EARTH STATIONS						
MAIN		0	0	0	0	0
REGIONAL		0	12	0	0	12
SMALL		0	26	18	23	67
TV/RO		0	179	89	208	476
DIRECT BROADCAST		0	0	0	160786	160786

ORIGINAL PAGE IS
OF POOR QUALITY

EUROPE

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0	1	0	0	1
	24 XP	0	2	1	4	7
	12 XP/GS	0	1	0	0	1
	24 XP/GS	0	2	1	4	7
DIRECT BROADCAST	MAIN	0	1	3	4	8
	GROUND SPARE	0	1	3	4	8
EARTH STATIONS						
MAIN		0	13	10	0	23
REGIONAL		0	34	46	63	143
SMALL		0	462	416	528	1406
TV/RO		0	596	801	3453	4850
DIRECT BROADCAST		0	103811	510371	3188671	3802853

MOST LIKELY
REGIONAL
DELTA

ORIGINAL PAGE IS
OF POOR QUALITY

AFRICA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0	0	0	1	1
	24 XP	0	1	1	2	4
	12 XP/GS	0	0	0	1	1
	24 XP/GS	0	1	1	2	4
DIRECT BROADCAST	MAIN	0	0	0	0	0
	GROUND SPARE	0	0	0	0	0
EARTH STATIONS						
MAIN		0	0	0	0	0
REGIONAL		0	14	1	9	24
SMALL		0	14	4	35	53
TV/RO		0	40	18	80	138
DIRECT BROADCAST		0	0	0	0	0

ORIGINAL PAGE IS
OF POOR QUALITY

ASIA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0	4	0	1	5
	24 XP	3	3	3	9	18
	12 XP/GS	0	4	0	1	5
	24 XP/GS	3	3	3	9	18
DIRECT BROADCAST	MAIN	0	0	1	2	3
	GROUND SPARE	0	0	1	2	3
EARTH STATIONS						
MAIN		0	3	4	1	8
REGIONAL		0	39	58	55	152
SMALL		0	207	457	546	1210
TV/RO		0	625	1490	4962	7077
DIRECT BROADCAST		0	0	310169	5987480	6297649

ORIGINAL PAGE IS
OF POOR QUALITY

OCEANIA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0	3	0	0	3
	24 XP	0	0	2	1	3
	12 XP/GS	0	3	0	0	3
	24 XP/GS	0	0	2	1	3
DIRECT BROADCAST	MAIN	0	0	1	1	2
	GROUND SPARE	0	0	1	1	2
EARTH STATIONS						
MAIN		0	3	0	0	3
REGIONAL		0	12	8	4	24
SMALL		0	44	26	35	105
TV/RO		0	25	20	114	159
DIRECT BROADCAST		0	0	31873	165476	197349

ORIGINAL PAGE IS
OF POOR QUALITY

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	6	13	0	2	21
	24 XP	11	21	29	81	142
	12 XP/GS	6	13	0	2	21
	24 XP/GS	11	21	29	81	142
DIRECT BROADCAST	MAIN	0	2	11	18	31
	GROUND SPARE	0	2	11	18	31
EARTH STATIONS						
MAIN		28.	25	18	6	77
REGIONAL		126	149	166	252	693
SMALL		637	7176	13471	32667	53951
TV/RO		3716	13077	12641	20340	49774
DIRECT BROADCAST		0	147664	977681	13998942	15124287

MOST LIKELY
REGIONAL
CUMULATIVE AFTER 1981

ORIGINAL PAGE IS
OF POOR QUALITY

NORTH AMERICA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	6	4	4	4	10
	24 XP	8	14	36	99	107
	12 XP/GS	6	4	4	4	10
	24 XP/GS	8	14	36	99	107
DIRECT BROADCAST	MAIN	0	1	7	17	17
	GROUND SPARE	0	1	7	17	17
EARTH STATIONS						
MAIN		28	6	10	15	43
REGIONAL		126	38	91	212	338
SMALL		637	6423	18973	50473	51110
TV/RO		3716	11512	21835	33358	37074
DIRECT BROADCAST		0	43853	169121	4665650	4665650

MOST LIKELY
REGIONAL
CUMULATIVE AFTER 1981

ORIGINAL PAGE IS
OF POOR QUALITY

SOUTH AMERICA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0	1	1	1	1
24 XP	0	1	1	3	3
12 XP/GS	0	1	1	1	1
24 XP/GS	0	1	1	3	3
DIRECT BROADCAST MAIN	0	0	0	1	1
GROUND SPARE	0	0	0	1	1
EARTH STATIONS					
MAIN	0	0	0	0	0
REGIONAL	0	12	12	12	12
SMALL	0	26	44	67	67
TV/RO	0	179	268	476	476
DIRECT BROADCAST	0	0	0	160786	160786

MOST LIKELY
REGIONAL
CUMULATIVE AFTER 1981

ORIGINAL PAGE IS
OF POOR QUALITY

EUROPE

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0	1	1	1	1
	24 XP	0	2	3	7	7
	12 XP/GS	0	1	1	1	1
	24 XP/GS	0	2	3	7	7
DIRECT BROADCAST	MAIN	0	1	4	8	8
	GROUND SPARE	0	1	4	8	8
EARTH STATIONS						
MAIN		0	13	23	23	23
REGIONAL		0	34	80	143	143
SMALL		0	462	878	1406	1406
TV/RO		0	596	1397	4850	4850
DIRECT BROADCAST		0	103811	614182	3802853	3802853

MOST LIKELY
REGIONAL
CUMULATIVE AFTER 1981

ORIGINAL PAGE IS
OF POOR QUALITY

AFRICA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0	0	0	1	1
	24 XP	0	1	2	4	4
	12 XP/GS	0	0	0	1	1
	24 XP/GS	0	1	2	4	4
DIRECT BROADCAST	MAIN	0	0	0	0	0
	GROUND SPARE	0	0	0	0	0
EARTH STATIONS						
MAIN		0	0	0	0	0
REGIONAL		0	14	15	24	24
SMALL		0	14	18	53	53
TV/RO		0	40	58	138	138
DIRECT BROADCAST		0	0	0	0	0

MOST LIKELY
REGIONAL
CUMULATIVE AFTER 1981

ORIGINAL PAGE IS
OF POOR QUALITY

ASIA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0	4	4	5	5
	24 XP	3	3	6	15	18
	12 XP/GS	0	4	4	5	5
	24 XP/GS	3	3	6	15	18
DIRECT BROADCAST	MAIN	0	0	1	3	3
	GROUND SPARE	0	0	1	3	3
EARTH STATIONS						
MAIN		0	3	7	8	8
REGIONAL		0	39	97	152	152
SMALL		0	207	664	1210	1210
TV/RO		0	625	2115	7077	7077
DIRECT BROADCAST		0	0	310169	6297649	6297649

ORIGINAL PAGE IS
OF POOR QUALITY

OCEANIA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0	3	3	3	3
	24 XP	0	0	2	3	3
	12 XP/GS	0	3	3	3	3
	24 XP/GS	0	0	2	3	3
DIRECT BROADCAST	MAIN	0	0	1	2	2
	GROUND SPARE	0	0	1	2	2
EARTH STATIONS						
MAIN		0	3	3	3	3
REGIONAL		0	12	20	24	24
SMALL		0	44	70	105	105
TV/RO		0	25	45	159	159
DIRECT BROADCAST		0	0	31873	197349	197349

MOST LIKELY
TOTAL
CUMULATIVE AFTER 1981

ORIGINAL PAGE IS
OF POOR QUALITY

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	6	13	13	15	21
	24 XP	11	21	50	131	142
	12 XP/CS	6	13	13	15	21
	24 XP/CS	11	21	50	131	142
DIRECT BROADCAST	MAIN	0	2	13	31	31
	GROUND SPARE	0	2	13	31	31
EARTH STATIONS						
MAIN		28	25	43	49	77
REGIONAL		126	149	315	567	693
SMALL		637	7176	20647	53314	53951
TV/RO		3716	13077	25718	46058	49774
DIRECT BROADCAST		0	147664	1125345	15124287	15124287

MOST LIKELY
REGIONAL
DELTA

ORIGINAL PAGE IS
OF POOR QUALITY

(1980 DOLLARS)

NORTH AMERICA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	132.00	88.00	0.00	0.00	220.00
24 XP	224.00	392.00	763.00	2205.00	3584.00
12 XP/GS	132.00	88.00	0.00	0.00	220.00
24 XP/GS	224.00	392.00	763.00	2205.00	3584.00
DIRECT BROADCAST MAIN	0.00	22.00	132.00	300.00	454.00
GROUND SPARE	0.00	22.00	132.00	300.00	454.00
EARTH STATIONS					
MAIN	43.12	9.24	6.16	7.70	66.22
REGIONAL	128.52	38.76	54.06	123.42	344.76
SMALL	76.50	395.50	753.00	1890.00	3115.00
TV/RO	92.90	290.30	255.58	288.08	926.85
DIRECT BROADCAST	0.00	21.93	62.63	2248.26	2332.83
NON HARDWARE					
PLANNING (EQ. UNITS)	10.00	1.70	2.70	7.00	21.40
LAUNCH (EQ. UNITS)	278.40	379.20	544.00	1442.00	2643.60
TURNKEY (EQ. UNITS)					
MAIN	1.16	0.00	0.00	0.00	1.16
REGIONAL	5.78	0.40	0.63	0.20	7.01
SMALL	10.91	2.82	0.00	0.00	13.73
TV/RO	0.11	0.08	0.15	0.15	0.48
OPERATION (EQ. UNITS)	12.00	12.00	15.00	30.00	69.00
TOTAL	1371.38	2155.93	3483.90	11046.81	18058.03

MOST LIKELY
REGIONAL
DELTA

ORIGINAL PAGE IS
OF POOR QUALITY

(1980 DOLLARS)

SOUTH AMERICA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	22.00	0.00	0.00	22.00
24 XP	0.00	28.00	0.00	70.00	98.00
12 XP/GS	0.00	22.00	0.00	0.00	22.00
24 XP/GS	0.00	28.00	0.00	70.00	98.00
DIRECT BROADCAST MAIN	0.00	0.00	0.00	30.00	30.00
GROUND SPARE	0.00	0.00	0.00	30.00	30.00
EARTH STATIONS					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	12.24	0.00	0.00	12.24
SMALL	0.00	13.00	9.00	11.50	33.50
TV/RO	0.00	4.48	2.23	5.20	11.90
DIRECT BROADCAST	0.00	0.00	0.00	80.39	80.39
NON HARDWARE					
PLANNING (EQ. UNITS)	0.00	18.00	0.00	0.00	18.00
LAUNCH (EQ. UNITS)	0.00	39.20	0.00	42.00	81.20
TURNKEY (EQ. UNITS)					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	3.06	0.00	0.00	3.06
SMALL	0.00	3.24	2.22	2.90	8.36
TV/RO	0.00	1.16	0.58	1.36	3.10
OPERATION (EQ. UNITS)	0.00	3.00	15.00	9.00	27.00
TOTAL	0.00	197.38	29.02	352.35	578.75

MOST LIKELY
REGIONAL
DELTA

ORIGINAL PAGE IS
OF POOR QUALITY

(1980 DOLLARS)

EUROPE

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	22.00	0.00	0.00	22.00
24 XP	0.00	56.00	28.00	140.00	224.00
12 XP/GS	0.00	22.00	0.00	0.00	22.00
24 XP/GS	0.00	56.00	28.00	140.00	224.00
DIRECT BROADCAST MAIN	0.00	22.00	66.00	120.00	208.00
GROUND SPARE	0.00	22.00	66.00	120.00	208.00
EARTH STATIONS					
MAIN	0.00	20.02	15.40	0.00	35.42
REGIONAL	0.00	34.68	46.92	64.26	145.86
SMALL	0.00	231.00	208.00	264.00	703.00
TV/RO	0.00	14.90	20.03	86.33	121.25
DIRECT BROADCAST	0.00	51.91	255.19	1594.34	1901.43
NON HARDWARE					
PLANNING (EQ. UNITS)	0.00	0.00	0.00	0.00	0.00
LAUNCH (EQ. UNITS)	0.00	0.00	0.00	0.00	0.00
TURNKEY (EQ. UNITS)					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	0.00	0.00	0.00	0.00
SMALL	0.00	0.00	0.00	0.00	0.00
TV/RO	0.00	0.00	0.00	0.00	0.00
OPERATION (EQ. UNITS)	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	552.51	733.53	2528.92	3814.96

MOST LIKELY
REGIONAL
DELTA

ORIGINAL PAGE IS
OF POOR QUALITY

(1980 DOLLARS)

AFRICA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	0.00	0.00	30.00	30.00
24 XP	0.00	28.00	28.00	70.00	126.00
12 XP/GS	0.00	0.00	0.00	30.00	30.00
24 XP/GS	0.00	28.00	28.00	70.00	126.00
DIRECT BROADCAST MAIN	0.00	0.00	0.00	0.00	0.00
GROUND SPARE	0.00	0.00	0.00	0.00	0.00
EARTH STATIONS					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	14.28	1.02	9.18	24.48
SMALL	0.00	7.00	2.00	17.50	26.50
TV/RO	0.00	1.00	0.45	2.00	3.45
DIRECT BROADCAST	0.00	0.00	0.00	0.00	0.00
NON HARDWARE					
PLANNING (EQ. UNITS)	3.00	6.00	3.00	6.00	18.00
LAUNCH (EQ. UNITS)	0.00	19.60	14.00	42.00	75.60
TURNKEY (EQ. UNITS)					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	3.57	0.26	2.17	5.99
SMALL	0.00	1.81	0.47	4.40	6.68
TV/RO	0.00	0.26	0.11	0.52	0.90
OPERATION (EQ. UNITS)	0.00	3.00	7.50	12.00	22.50
TOTAL	3.00	112.52	84.80	295.77	496.10

MOST LIKELY
REGIONAL
DELTA

ORIGINAL PAGE IS
OF POOR QUALITY

(1980 DOLLARS)

ASIA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	88.00	0.00	30.00	118.00
24 XP	84.00	84.00	84.00	315.00	567.00
12 XP/GS	0.00	88.00	0.00	30.00	118.00
24 XP/GS	84.00	84.00	84.00	315.00	567.00
DIRECT BROADCAST MAIN	0.00	0.00	22.00	60.00	82.00
GROUND SPARE	0.00	0.00	22.00	60.00	82.00
EARTH STATIONS					
MAIN	0.00	4.62	6.16	1.54	12.32
REGIONAL	0.00	39.78	59.16	56.10	155.04
SMALL	0.00	103.50	228.50	273.00	605.00
TV/RO	0.00	15.63	37.25	124.05	176.93
DIRECT BROADCAST	0.00	0.00	155.08	2993.74	3148.82
NON HARDWARE					
PLANNING (EQ. UNITS)	21.00	15.00	6.00	3.00	45.00
LAUNCH (EQ. UNITS)	19.60	117.60	28.00	98.00	263.20
TURNKEY (EQ. UNITS)					
MAIN	0.00	1.16	0.00	0.00	1.16
REGIONAL	0.00	10.02	3.61	5.33	18.97
SMALL	0.00	25.89	17.63	26.72	70.23
TV/RO	0.00	4.06	2.87	11.49	18.41
OPERATION (EQ. UNITS)	9.00	18.00	28.50	42.00	97.50
TOTAL	217.60	699.25	734.76	4444.97	6146.57

MOST LIKELY
REGIONAL
DELTA

ORIGINAL PAGE IS
OF POOR QUALITY

(1980 DOLLARS)

OCEANIA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	66.00	0.00	0.00	66.00
24 XP	0.00	0.00	56.00	35.00	91.00
12 XP/GS	0.00	66.00	0.00	0.00	66.00
24 XP/GS	0.00	0.00	56.00	35.00	91.00
DIRECT BROADCAST MAIN	0.00	0.00	22.00	30.00	52.00
GROUND SPARE	0.00	0.00	22.00	30.00	52.00
EARTH STATIONS					
MAIN	0.00	4.62	0.00	0.00	4.62
REGIONAL	0.00	12.24	8.16	4.08	24.48
SMALL	0.00	22.00	13.00	17.50	52.50
TV/RO	0.00	0.63	[illegible].50	2.85	3.98
DIRECT BROADCAST	0.00	0.00	15.94	82.74	98.67
NON HARDWARE					
PLANNING (EQ. UNITS)	6.00	3.00	0.00	0.00	9.00
LAUNCH (EQ. UNITS)	0.00	58.80	42.00	28.00	128.80
TURNKEY (EQ. UNITS)					
MAIN	0.00	1.16	0.00	0.00	1.16
REGIONAL	0.00	3.18	1.90	1.14	6.22
SMALL	0.00	5.51	3.22	4.36	13.10
TV/RO	0.00	0.16	0.13	0.74	1.03
OPERATION (EQ. UNITS)	0.00	4.50	6.00	0.00	10.50
TOTAL	6.00	247.79	246.86	271.40	772.05

ORIGINAL PAGE IS
OF POOR QUALITY

MOST LIKELY
TOTAL
DELTA

(1980 DOLLARS)

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	132.00	286.00	0.00	60.00	478.00
	24 XP	308.00	588.00	959.00	2835.00	4690.00
	12 XP/GS	132.00	286.00	0.00	60.00	478.00
	24 XP/GS	308.00	588.00	959.00	2835.00	4690.00
DIRECT BROADCAST	MAIN	0.00	44.00	242.00	540.00	826.00
	GROUND SPARE	0.00	44.00	242.00	540.00	826.00
EARTH STATIONS						
MAIN		43.12	38.50	27.72	9.24	118.58
REGIONAL		128.52	151.98	169.32	257.04	706.86
SMALL		76.50	772.00	1213.50	2473.50	4535.50
TV/RO		92.90	326.93	315.03	508.50	1244.35
DIRECT BROADCAST		0.00	73.83	488.84	6999.47	7562.14
NON HARDWARE						
PLANNING (EQ. UNITS)		40.00	43.70	11.70	16.00	111.40
LAUNCH (EQ. UNITS)		298.00	614.40	628.00	1652.00	3192.40
TURNKEY (EQ. UNITS)						
MAIN		1.16	2.31	0.00	0.00	3.47
REGIONAL		5.78	20.23	6.40	8.84	41.25
SMALL		10.91	39.27	23.53	38.38	112.09
TV/RO		0.11	5.73	3.83	14.26	23.92
OPERATION (EQ. UNITS)		21.00	40.50	72.00	93.00	226.50
TOTAL		1597.98	3965.38	5362.87	18940.22	29866.45

ORIGINAL PAGE IS
OF POOR QUALITY

MOST LIKELY
REGIONAL
CUMULATIVE AFTER 1981

(1980 DOLLARS)

NORTH AMERICA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	132.00	88.00	88.00	88.00	220.00
24 XP	224.00	392.00	1155.00	3360.00	3584.00
12 XP/GS	132.00	88.00	88.00	88.00	220.00
24 XP/GS	224.00	392.00	1155.00	3360.00	3584.00
DIRECT BROADCAST MAIN	0.00	22.00	154.00	454.00	454.00
GROUND SPARE	0.00	22.00	154.00	454.00	454.00
EARTH STATIONS					
MAIN	43.12	9.24	15.40	23.10	66.22
REGIONAL	128.52	38.76	92.82	216.24	344.76
SMALL	76.50	395.50	1148.50	3038.50	3115.00
TV/RO	92.90	290.30	545.88	833.95	926.85
DIRECT BROADCAST	0.00	21.93	84.56	2332.83	2332.83
NON HARDWARE					
PLANNING (EQ. UNITS)	10.00	1.70	4.40	11.40	21.40
LAUNCH (EQ. UNITS)	278.40	379.20	923.20	2365.20	2643.60
TURNKEY (EQ. UNITS)					
MAIN	1.16	0.00	0.00	0.00	1.16
REGIONAL	5.78	0.40	1.03	1.24	7.01
SMALL	10.91	2.82	2.82	2.82	13.73
TV/RO	0.11	0.08	0.22	0.37	0.48
OPERATION (EQ. UNITS)	12.00	12.00	27.00	57.00	69.00
TOTAL	1371.38	2155.93	5639.83	16686.64	18058.03

ORIGINAL PAGE IS
OF POOR QUALITY

MOST LIKELY
REGIONAL
CUMULATIVE AFTER 1981

(1980 *DOLLARS*)

SOUTH AMERICA

	1981	1985	1990	2000	*TOTAL*
SATELLITES					
GENERAL PURPOSE 12 *XP*	0.00	22.00	22.00	22.00	22.00
24 *XP*	0.00	28.00	28.00	98.00	98.00
12 *XP/GS*	0.00	22.00	22.00	22.00	22.00
24 *XP/GS*	0.00	28.00	28.00	98.00	98.00
DIRECT BROADCAST MAIN	0.00	0.00	0.00	30.00	30.00
GROUND SPARE	0.00	0.00	0.00	30.00	30.00
EARTH STATIONS					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	12.24	12.24	12.24	12.24
SMALL	0.00	13.00	22.00	33.50	33.50
TV/RO	0.00	4.48	6.70	11.90	11.90
DIRECT BROADCAST	0.00	0.00	0.00	80.39	80.39
NON HARDWARE					
PLANNING (EQ. UNITS)	0.00	18.00	18.00	18.00	18.00
LAUNCH (EQ. UNITS)	0.00	39.20	39.20	81.20	81.20
TURNKEY (EQ. UNITS)					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	3.06	3.06	3.06	3.06
SMALL	0.00	3.24	5.46	8.36	8.36
TV/RO	0.00	1.16	1.74	3.10	3.10
OPERATION (EQ. UNITS)	0.00	3.00	18.00	27.00	27.00
TOTAL	0.00	197.38	226.40	578.75	578.75

MOST LIKELY
REGIONAL
CUMULATIVE AFTER 1981

ORIGINAL PAGE IS
OF POOR QUALITY

(1980 DOLLARS)

EUROPE

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	22.00	22.00	22.00	22.00
24 XP	0.00	56.00	84.00	224.00	224.00
12 XP/GS	0.00	22.00	22.00	22.00	22.00
24 XP/GS	0.00	56.00	84.00	224.00	224.00
DIRECT BROADCAST MAIN	0.00	22.00	88.00	208.00	208.00
GROUND SPARE	0.00	22.00	88.00	208.00	208.00
EARTH STATIONS					
MAIN	0.00	20.02	35.42	35.42	35.42
REGIONAL	0.00	34.68	81.60	145.86	145.86
SMALL	0.00	231.00	439.00	703.00	703.00
TV/RO	0.00	14.90	34.93	121.25	121.25
DIRECT BROADCAST	0.00	51.91	307.09	1901.43	1901.43
NON HARDWARE					
PLANNING (EQ. UNITS)	0.00	0.00	0.00	0.00	0.00
LAUNCH (EQ. UNITS)	0.00	0.00	0.00	0.00	0.00
TURNKEY (EQ. UNITS)					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	0.00	0.00	0.00	0.00
SMALL	0.00	0.00	0.00	0.00	0.00
TV/RO	0.00	0.00	0.00	0.00	0.00
OPERATION (EQ. UNITS)	0.00	0.00	0.00	0.00	0.00
TOTAL	0.00	552.51	1286.04	3814.96	3814.96

MOST LIKELY
REGIONAL
CUMULATIVE AFTER 1981

ORIGINAL PAGE IS
OF POOR QUALITY

(1980 DOLLARS)

AFRICA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	0.00	0.00	30.00	30.00
24 XP	0.00	28.00	56.00	126.00	126.00
12 XP/GS	0.00	0.00	0.00	30.00	30.00
24 XP/GS	0.00	28.00	56.00	126.00	126.00
DIRECT BROADCAST MAIN	0.00	0.00	0.00	0.00	0.00
GROUND SPARE	0.00	0.00	0.00	0.00	0.00
EARTH STATIONS					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	14.28	15.30	24.48	24.48
SMALL	0.00	7.00	9.00	26.50	26.50
TV/RO	0.00	1.00	1.45	3.45	3.45
DIRECT BROADCAST	0.00	0.00	0.00	0.00	0.00
NON HARDWARE					
PLANNING (EQ. UNITS)	3.00	6.00	9.00	15.00	18.00
LAUNCH (EQ. UNITS)	0.00	19.60	33.60	75.60	75.60
TURNKEY (EQ. UNITS)					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	3.57	3.83	5.99	5.99
SMALL	0.00	1.81	2.28	6.68	6.68
TV/RO	0.00	0.26	0.37	0.90	0.90
OPERATION (EQ. UNITS)	0.00	3.00	10.50	22.50	22.50
TOTAL	3.00	112.52	197.32	493.10	496.10

ORIGINAL PAGE IS
OF POOR QUALITY

MOST LIKELY
REGIONAL
CUMULATIVE AFTER 1981

(1980 DOLLARS)

ASIA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	88.00	88.00	118.00	118.00
24 XP	84.00	84.00	168.00	483.00	567.00
12 XP/GS	0.00	88.00	88.00	118.00	118.00
24 XP/GS	84.00	84.00	168.00	483.00	567.00
DIRECT BROADCAST MAIN	0.00	0.00	22.00	82.00	82.00
GROUND SPARE	0.00	0.00	22.00	82.00	82.00
EARTH STATIONS					
MAIN	0.00	4.62	10.78	12.32	12.32
REGIONAL	0.00	39.78	88.94	155.04	155.04
SMALL	0.00	103.50	332.00	605.00	605.00
TV/RO	0.00	15.63	52.88	176.93	176.93
DIRECT BROADCAST	0.00	0.00	155.08	3148.82	3148.82
NON HARDWARE					
PLANNING (EQ. UNITS)	21.00	15.00	21.00	24.00	45.00
LAUNCH (EQ. UNITS)	19.60	117.60	145.60	243.60	263.20
TURNKEY (EQ. UNITS)					
MAIN	0.00	1.16	1.16	1.16	1.16
REGIONAL	0.00	10.02	13.63	18.97	18.97
SMALL	0.00	25.89	43.51	70.23	70.23
TV/RO	0.00	4.06	6.93	18.41	18.41
OPERATION (EQ. UNITS)	9.00	18.00	46.50	88.50	97.50
TOTAL	217.60	699.25	1484.01	5928.97	6146.57

ORIGINAL PAGE IS
OF POOR QUALITY

MOST LIKELY
REGIONAL
CUMULATIVE AFTER 1981

(1980 DOLLARS)

OCEANIA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0.00	66.00	66.00	66.00	66.00
	24 XP	0.00	0.00	56.00	91.00	91.00
	12 XP/GS	0.00	66.00	66.00	66.00	66.00
	24 XP/GS	0.00	0.00	56.00	91.00	91.00
DIRECT BROADCAST	MAIN	0.00	0.00	22.00	52.00	52.00
	GROUND SPARE	0.00	0.00	22.00	52.00	52.00
EARTH STATIONS						
MAIN		0.00	4.62	4.62	4.62	4.62
REGIONAL		0.00	12.24	20.40	24.48	24.48
SMALL		0.00	22.00	35.00	52.50	52.50
TV/RO		0.00	0.63	1.13	3.98	3.98
DIRECT BROADCAST		0.00	0.00	15.94	98.67	98.67
NON HARDWARE						
PLANNING (EQ. UNITS)		6.00	3.00	3.00	3.00	9.00
LAUNCH (EQ. UNITS)		0.00	58.80	100.80	128.80	128.80
TURNKEY (EQ. UNITS)						
MAIN		0.00	1.16	1.16	1.16	1.16
REGIONAL		0.00	3.18	5.08	6.22	6.22
SMALL		0.00	5.51	8.74	13.10	13.10
TV/RO		0.00	0.16	0.29	1.03	1.03
OPERATION (EQ. UNITS)		0.00	4.50	10.50	10.50	10.50
TOTAL		6.00	247.79	494.65	766.05	772.05

MOST LIKELY
TOTAL
CUMULATIVE AFTER 1981

ORIGINAL PAGE IS
OF POOR QUALITY

(1980 DOLLARS)

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	132.00	286.00	286.00	346.00	478.00
24 XP	308.00	588.00	1547.00	4382.00	4690.00
12 XP/GS	132.00	286.00	286.00	346.00	478.00
24 XP/GS	308.00	588.00	1547.00	4382.00	4690.00
DIRECT BROADCAST MAIN	0.00	44.00	286.00	826.00	826.00
GROUND SPARE	0.00	44.00	286.00	826.00	826.00
EARTH STATIONS					
MAIN	43.12	38.50	66.22	75.46	118.58
REGIONAL	128.52	151.98	321.30	578.34	706.86
SMALL	76.50	772.00	1985.50	4459.00	4535.50
TV/RO	92.90	326.93	642.95	1151.45	1244.35
DIRECT BROADCAST	0.00	73.83	562.67	7562.14	7562.14
NON HARDWARE					
PLANNING (EQ. UNITS)	40.00	43.70	55.40	71.40	111.40
LAUNCH (EQ. UNITS)	298.00	614.40	1242.40	2894.40	3192.40
TURNKEY (EQ. UNITS)					
MAIN	1.16	2.31	2.31	2.31	3.47
REGIONAL	5.78	20.23	26.63	35.47	41.25
SMALL	10.91	39.27	62.80	101.18	112.09
TV/RO	0.11	5.73	9.56	23.81	23.92
OPERATION (EQ. UNITS)	21.00	40.50	112.50	205.50	226.50
TOTAL	1597.98	3965.38	9328.24	28268.47	29866.45

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
DELTA

NORTH AMERICA

		1981	1985	1990	2000	*TOTAL*
SATELLITES						
GENERAL PURPOSE	12 *XP*	6	4	0	0	10
	24 *XP*	8	16	25	66	115
	12 *XP/GS*	6	4	0	0	10
	24 *XP/GS*	8	16	25	66	115
DIRECT BROADCAST MAIN		0	1	6	13	20
	GROUND SPARE	0	1	6	13	20
EARTH STATIONS						
MAIN		28	7	4	5	44
REGIONAL		126	39	63	151	379
SMALL		637	6823	14750	89450	111660
TV/RO		3716	11812	10023	12523	38074
DIRECT BROADCAST		0	43853	131268	5600529	5775650

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
DELTA

SOUTH AMERICA

		1981	1985	1990	2000	*TOTAL*
SATELLITES						
GENERAL PURPOSE	12 *XP*	0	3	1	0	4
	24 *XP*	0	1	0	5	6
	12 *XP/GS*	0	3	1	0	4
	24 *XP/GS*	0	1	0	5	6
DIRECT BROADCAST	*MAIN*	0	0	0	1	1
	GROUND SPARE	0	0	0	1	1
EARTH STATIONS						
MAIN		0	0	0	0	0
REGIONAL		0	14	1	1	16
SMALL		0	29	18	26	73
TV/RO		0	197	104	211	512
DIRECT BROADCAST		0	0	0	231532	231532

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
DELTA

EUROPE

		1981	1985	1990	2000	*TOTAL*
SATELLITES						
GENERAL PURPOSE	12 *XP*	0	1	0	0	1
	24 *XP*	0	5	1	7	13
	12 *XP/GS*	0	1	0	0	1
	24 *XP/GS*	0	5	1	7	13
DIRECT BROADCAST MAIN		0	1	4	5	10
GROUND SPARE		0	1	4	5	10
EARTH STATIONS						
MAIN		6	16	4	0	26
REGIONAL		12	42	39	67	160
SMALL		100	516	376	590	1582
TV/RO		214	647	842	4143	5846
DIRECT BROADCAST		0	103811	510371	3188671	3802853

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
DELTA

AFRICA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0	0	2	1	3
	24 XP	0	1	2	3	6
	12 XP/GS	0	0	2	1	3
	24 XP/GS	0	1	2	3	6
DIRECT BROADCAST	MAIN	0	0	0	0	0
	GROUND SPARE	0	0	0	0	0
EARTH STATIONS						
MAIN		0	0	0	0	0
REGIONAL		0	7	17	1	25
SMALL		0	8	25	22	55
TV/RO		0	34	48	67	149
DIRECT BROADCAST		0	0	0	0	0

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
DELTA

ASIA

		1981	1985	1990	2000	*TOTAL*
SATELLITES						
GENERAL PURPOSE	12 *XP*	0	4	2	0	6
	24 *XP*	3	7	5	15	30
	12 *XP/CS*	0	4	2	0	6
	24 *XP/CS*	3	7	5	15	30
DIRECT BROADCAST	*MAIN*	0	0	3	3	6
	GROUND SPARE	0	0	3	3	6
EARTH STATIONS						
MAIN		5	2	0	0	7
REGIONAL		51	54	30	45	180
SMALL		350	382	289	188	1209
TV/RO		1210	1545	2618	6553	11926
DIRECT BROADCAST		0	0	988828	7108496	8097324

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
DELTA

OCEANIA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0	3	0	0	3
	24 XP	0	0	0	3	3
	12 XP/GS	0	3	0	0	3
	24 XP/GS	0	0	0	3	3
DIRECT BROADCAST	MAIN	0	0	2	2	4
	GROUND SPARE	0	0	2	2	4
EARTH STATIONS						
MAIN		0	3	0	0	3
REGIONAL		0	11	8	5	24
SMALL		0	40	24	41	105
TV/RO		0	22	18	102	142
DIRECT BROADCAST		0	0	38248	198571	236819
SATELLITES						
GENERAL PURPOSE	12 XP	0	3	0	0	3
	24 XP	0	0	0	3	3
	12 XP/GS	0	3	0	0	3
	24 XP/GS	0	0	0	3	3
DIRECT BROADCAST	MAIN	0	0	2	2	4
	GROUND SPARE	0	0	2	2	4
EARTH STATIONS						
MAIN		0	3	0	0	3
REGIONAL		0	11	8	5	24
SMALL		0	40	24	41	105
TV/RO		0	22	18	102	142
DIRECT BROADCAST		0	0	38248	198571	236819

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
TOTAL
DELTA

		1981	1985	1990	2000	*TOTAL*
SATELLITES						
GENERAL PURPOSE	12 *XP*	6	15	5	1	27
	24 *XP*	11	30	33	99	173
	12 *XP/GS*	6	15	5	1	27
	24 *XP/GS*	11	30	33	99	173
DIRECT BROADCAST	*MAIN*	0	2	15	24	41
	GROUND SPARE	0	2	15	24	41
EARTH STATIONS						
MAIN		39	28	8	5	80
REGIONAL		189	167	158	270	784
SMALL		1087	7798	15482	90317	114684
TV/RO		5140	14257	13653	23599	56649
DIRECT BROADCAST		0	147664	1568715	16327799	18144178

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
CUMULATIVE AFTER 1981

NORTH AMERICA

		1981	1985	1990	2000	*TOTAL*
SATELLITES						
GENERAL PURPOSE	12 *XP*	6	4	4	4	10
	24 *XP*	8	16	41	107	115
	12 *XP/GS*	6	4	4	4	10
	24 *XP/GS*	8	16	41	107	115
DIRECT BROADCAST	*MAIN*	0	1	7	20	20
	GROUND SPARE	0	1	7	20	20
EARTH STATIONS						
MAIN		28	7	11	16	44
REGIONAL		126	39	102	253	379
SMALL		637	6823	21573	111023	111660
TV/RO		3716	11812	21835	34358	38074
DIRECT BROADCAST		0	43853	175121	5775650	5775650

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
CUMULATIVE AFTER 1981

SOUTH AMERICA

SATELLITES		1981	1985	1990	2000	TOTAL
GENERAL PURPOSE	12 XP	0	3	4	4	4
	24 XP	0	1	1	6	6
	12 XP/GS	0	3	4	4	4
	24 XP/GS	0	1	1	6	6
DIRECT BROADCAST	MAIN	0	0	0	1	1
	GROUND SPARE	0	0	0	1	1
EARTH STATIONS						
MAIN		0	0	0	0	0
REGIONAL		0	14	15	16	16
SMALL		0	29	47	73	73
TV/RO		0	197	301	512	512
DIRECT BROADCAST		0	0	0	231532	231532

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
CUMULATIVE AFTER 1981

EUROPE

		1981	1985	1990	2000	*TOTAL*
SATELLITES						
GENERAL PURPOSE	12 *XP*	0	1	1	1	1
	24 *XP*	0	5	6	13	13
	12 *XP/GS*	0	1	1	1	1
	24 *XP/GS*	0	5	6	13	13
DIRECT BROADCAST	*MAIN*	0	1	5	10	10
	GROUND SPARE	0	1	5	10	10
EARTH STATIONS						
MAIN		6	16	20	20	26
REGIONAL		12	42	81	148	160
SMALL		100	516	892	1482	1582
TV/RO		214	647	1489	5632	5846
DIRECT BROADCAST		0	103811	614182	3802853	3802853

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
CUMULATIVE AFTER 1981

AFRICA

SATELLITES		1981	1985	1990	2000	TOTAL
GENERAL PURPOSE	12 XP	0	0	2	3	3
	24 XP	0	1	3	6	6
	12 XP/GS	0	0	2	3	3
	24 XP/GS	0	1	3	6	6
DIRECT BROADCAST	MAIN	0	0	0	0	0
	GROUND SPARE	0	0	0	0	0
EARTH STATIONS						
MAIN		0	0	0	0	0
REGIONAL		0	7	24	25	25
SMALL		0	8	33	55	55
TV/RO		0	34	82	149	149
DIRECT BROADCAST		0	0	0	0	0

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
CUMULATIVE AFTER 1981

ASIA

		1981	1985	1990	2000	*TOTAL*
SATELLITES						
GENERAL PURPOSE	12 *XP*	0	4	6	6	6
	24 *XP*	3	7	12	27	30
	12 *XP/GS*	0	4	6	6	6
	24 *XP/GS*	3	7	12	27	30
DIRECT BROADCAST	*MAIN*	0	0	3	6	6
	GROUND SPARE	0	0	3	6	6
EARTH STATIONS						
MAIN		5	2	2	2	7
REGIONAL		51	54	84	129	180
SMALL		350	382	671	859	1209
TV/RO		1210	1545	4163	10716	11926
DIRECT BROADCAST		0	0	988828	8097324	8097324

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
CUMULATIVE AFTER 1981

OCEANIA

		1981	1985	1990	2000	*TOTAL*
SATELLITES						
GENERAL PURPOSE	12 *XP*	0	3	3	3	3
	24 *XP*	0	0	0	3	3
	12 *XP/GS*	0	3	3	3	3
	24 *XP/GS*	0	0	0	3	3
DIRECT BROADCAST	*MAIN*	0	0	2	4	4
	GROUND SPARE	0	0	2	4	4
EARTH STATIONS						
MAIN		0	3	3	3	3
REGIONAL		0	11	19	24	24
SMALL		0	40	64	105	105
TV/RO		0	22	40	142	142
DIRECT BROADCAST		0	0	38248	236819	236819

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
TOTAL
CUMULATIVE AFTER 1981

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	6	15	20	21	27
24 XP	11	30	63	162	173
12 XP/GS	6	15	20	21	27
24 XP/GS	11	30	63	162	173
DIRECT BROADCAST MAIN	0	2	17	41	41
GROUND SPARE	0	2	17	41	41
EARTH STATIONS					
MAIN	39	28	36	41	80
REGIONAL	189	167	325	595	784
SMALL	1087	7798	23280	113597	114684
TV/RO	5140	14257	27910	51509	56649
DIRECT BROADCAST	0	147664	1816379	18144178	18144178

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
DELTA

(1980 DOLLARS)

NORTH AMERICA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	132.00	88.00	0.00	0.00	220.00
24 XP	224.00	448.00	861.00	2310.00	3843.00
12 XP/GS	132.00	88.00	0.00	0.00	220.00
24 XP/GS	224.00	448.00	861.00	2310.00	3843.00
DIRECT BROADCAST MAIN	0.00	22.00	132.00	390.00	544.00
GROUND SPARE	0.00	22.00	132.00	390.00	544.00
EARTH STATIONS					
MAIN	42.62	10.00	6.16	7.70	66.48
REGIONAL	128.46	9.02	55.08	125.46	318.02
SMALL	76.50	419.50	885.00	5367.00	6748.00
TV/RO	92.40	295.30	250.58	313.08	951.35
DIRECT BROADCAST	0.00	21.93	65.63	2800.26	2887.83
NON HARDWARE					
PLANNING (EQ. UNITS)	10.00	1.70	2.30	7.50	21.50
LAUNCH (EQ. UNITS)	278.40	418.40	608.00	1556.00	2860.80
TURNKEY (EQ. UNITS)					
MAIN	1.16	0.00	0.00	0.00	1.16
REGIONAL	5.78	0.40	0.63	0.20	7.01
SMALL	10.91	2.82	0.00	0.00	13.73
TV/RO	0.11	0.08	0.15	0.15	0.48
OPERATION (EQ. UNITS)	12.00	12.00	15.00	30.00	69.00
TOTAL	1370.32	2307.15	3874.52	15607.35	23159.35

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
DELTA

(1980 DOLLARS)

SOUTH AMERICA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0.00	66.00	22.00	0.00	88.00
	24 XP	0.00	28.00	0.00	175.00	203.00
	12 XP/GS	0.00	66.00	22.00	0.00	88.00
	24 XP/GS	0.00	28.00	0.00	175.00	203.00
DIRECT BROADCAST	MAIN	0.00	0.00	0.00	30.00	30.00
	GROUND SPARE	0.00	0.00	0.00	30.00	30.00
EARTH STATIONS						
MAIN		0.00	0.00	0.00	0.00	0.00
REGIONAL		0.00	14.28	1.02	1.02	16.32
SMALL		0.00	14.50	9.00	13.00	36.50
TV/RO		0.00	4.93	2.60	5.28	12.80
DIRECT BROADCAST		0.00	0.00	0.00	115.77	115.77
NON HARDWARE						
PLANNING (EQ. UNITS)		6.00	21.00	0.00	0.00	27.00
LAUNCH (EQ. UNITS)		0.00	78.40	14.00	84.00	176.40
TURNKEY (EQ. UNITS)						
MAIN		0.00	0.00	0.00	0.00	0.00
REGIONAL		0.00	3.57	0.26	0.26	4.08
SMALL		0.00	3.59	2.33	3.18	9.10
TV/RO		0.00	1.28	0.67	1.38	3.33
OPERATION (EQ. UNITS)		0.00	7.50	22.50	19.50	49.50
TOTAL		6.00	337.05	96.37	653.37	1092.80

OPTIMISTIC
REGIONAL
DELTA

ORIGINAL PAGE IS
OF POOR QUALITY

(1980 DOLLARS)

EUROPE

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0.00	22.00	0.00	0.00	22.00
	24 XP	0.00	140.00	28.00	245.00	413.00
	12 XP/GS	0.00	22.00	0.00	0.00	22.00
	24 XP/GS	0.00	140.00	28.00	245.00	413.00
DIRECT BROADCAST	MAIN	0.00	22.00	88.00	150.00	260.00
	GROUND SPARE	0.00	22.00	88.00	150.00	260.00
EARTH STATIONS						
MAIN		9.24	24.64	6.16	0.00	40.04
REGIONAL		12.24	42.84	39.78	68.34	163.20
SMALL		50.00	258.00	188.00	295.00	791.00
TV/RO		5.35	16.18	21.05	103.58	146.15
DIRECT BROADCAST		0.00	51.91	255.19	1594.34	1901.43
NON HARDWARE						
PLANNING (EQ. UNITS)		0.00	0.00	0.00	0.00	0.00
LAUNCH (EQ. UNITS)		0.00	0.00	0.00	0.00	0.00
TURNKEY (EQ. UNITS)						
MAIN		0.00	0.00	0.00	0.00	0.00
REGIONAL		0.00	0.00	0.00	0.00	0.00
SMALL		0.00	0.00	0.00	0.00	0.00
TV/RO		0.00	0.00	0.00	0.00	0.00
OPERATION (EQ. UNITS)		0.00	0.00	0.00	0.00	0.00
TOTAL		76.83	761.56	742.18	2851.25	4431.82

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
DELTA

(1980 DOLLARS)

AFRICA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	0.00	44.00	30.00	74.00
24 XP	0.00	28.00	56.00	105.00	189.00
12 XP/GS	0.00	0.00	44.00	30.00	74.00
24 XP/GS	0.00	28.00	56.00	105.00	189.00
DIRECT BROADCAST MAIN	0.00	0.00	0.00	0.00	0.00
GROUND SPARE	0.00	0.00	0.00	0.00	0.00
EARTH STATIONS					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	7.14	17.34	1.02	25.50
SMALL	0.00	4.00	12.50	11.00	27.50
TV/RO	0.00	0.85	1.20	1.68	3.73
DIRECT BROADCAST	0.00	0.00	0.00	0.00	0.00
NON HARDWARE					
PLANNING (EQ. UNITS)	3.00	9.00	15.00	0.00	27.00
LAUNCH (EQ. UNITS)	0.00	19.60	56.00	56.00	131.60
TURNKEY (EQ. UNITS)					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	1.79	4.21	0.26	6.25
SMALL	0.00	1.06	3.03	2.74	6.83
TV/RO	0.00	0.22	0.31	0.44	0.97
OPERATION (EQ. UNITS)	0.00	3.00	13.50	28.50	45.00
TOTAL	3.00	102.65	323.09	371.63	800.37

OPTIMISTIC
REGIONAL
DELTA

ORIGINAL PAGE IS
OF POOR QUALITY

(1980 DOLLARS)

ASIA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	0.00	88.00	44.00	0.00	132.00
	24 XP	84.00	196.00	140.00	525.00	945.00
	12 XP/CS	0.00	88.00	44.00	0.00	132.00
	24 XP/CS	84.00	196.00	140.00	525.00	945.00
DIRECT BROADCAST	MAIN	0.00	0.00	66.00	90.00	156.00
	GROUND SPARE	0.00	0.00	66.00	90.00	156.00
EARTH STATIONS						
MAIN		7.70	3.08	0.00	0.00	10.78
REGIONAL		52.02	55.08	30.60	45.90	183.60
SMALL		175.00	191.00	144.50	94.00	604.50
TV/RO		30.25	38.63	65.45	163.83	298.15
DIRECT BROADCAST		0.00	0.00	494.41	3554.25	4048.66
NON HARDWARE						
PLANNING (EQ. UNITS)		9.00	18.00	9.00	0.00	36.00
LAUNCH (EQ. UNITS)		0.00	156.80	70.00	126.00	352.80
TURNKEY (EQ. UNITS)						
MAIN		0.00	0.77	0.00	0.00	0.77
REGIONAL		0.26	10.64	3.69	4.50	19.09
SMALL		0.31	27.47	18.85	23.51	70.14
TV/RO		0.02	4.17	3.14	12.57	19.91
OPERATION (EQ. UNITS)		0.00	6.00	7.50	13.50	27.00
TOTAL		442.56	1079.64	1347.14	5268.06	8137.40

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
DELTA

(1980 DOLLARS)

OCEANIA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	66.00	0.00	0.00	66.00
24 XP	0.00	0.00	0.00	105.00	105.00
12 XP/GS	0.00	66.00	0.00	0.00	66.00
24 XP/GS	0.00	0.00	0.00	105.00	105.00
DIRECT BROADCAST MAIN	0.00	0.00	44.00	60.00	104.00
GROUND SPARE	0.00	0.00	44.00	60.00	104.00
EARTH STATIONS					
MAIN	0.00	4.62	0.00	0.00	4.62
REGIONAL	0.00	11.22	8.16	5.10	24.48
SMALL	0.00	20.00	12.00	20.50	52.50
TV/RO	0.00	0.55	0.45	2.55	3.55
DIRECT BROADCAST	0.00	0.00	19.12	99.29	118.41
NON HARDWARE					
PLANNING (EQ. UNITS)	3.00	6.00	0.00	0.00	9.00
LAUNCH (EQ. UNITS)	0.00	58.80	28.00	70.00	156.80
TURNKEY (EQ. UNITS)					
MAIN	0.00	1.16	0.00	0.00	1.16
REGIONAL	0.00	2.69	2.21	1.19	6.10
SMALL	0.00	5.03	2.96	5.11	13.09
TV/RO	0.00	0.14	0.12	0.66	0.93
OPERATION (EQ. UNITS)	0.00	3.00	7.50	0.00	10.50
TOTAL	3.00	245.21	168.52	534.40	951.13

OPTIMISTIC
TOTAL
DELTA

ORIGINAL PAGE IS
OF POOR QUALITY

(1980 DOLLARS)

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	132.00	330.00	110.00	30.00	602.00
	24 XP	308.00	840.00	1085.00	3465.00	5698.00
	12 XP/GS	132.00	330.00	110.00	30.00	602.00
	24 XP/GS	308.00	840.00	1085.00	3465.00	5698.00
DIRECT BROADCAST	MAIN	0.00	44.00	330.00	720.00	1094.00
	GROUND SPARE	0.00	44.00	330.00	720.00	1094.00
EARTH STATIONS						
MAIN		59.56	42.34	12.32	7.70	121.92
REGIONAL		192.72	139.58	151.98	246.84	731.12
SMALL		301.50	907.00	1251.00	5800.50	8260.00
TV/RO		128.00	356.43	341.33	589.98	1415.73
DIRECT BROADCAST		0.00	73.83	834.36	8163.90	9072.09
NON HARDWARE						
PLANNING (EQ. UNITS)		31.00	55.70	26.30	7.50	120.50
LAUNCH (EQ. UNITS)		278.40	732.00	776.00	1892.00	3678.40
TURNKEY (EQ. UNITS)						
MAIN		1.16	1.93	0.00	0.00	3.08
REGIONAL		6.03	19.09	11.00	6.41	42.52
SMALL		11.22	39.96	27.16	34.55	112.89
TV/RO		0.13	5.89	4.39	15.20	25.61
OPERATION (EQ. UNITS)		12.00	31.50	66.00	91.50	201.00
TOTAL		1901.71	4833.25	6551.83	25286.07	38572.86

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
CUMULATIVE AFTER 1981

(1980 DOLLARS)

NORTH AMERICA

		1981	1985	1990	2000	TOTAL
SATELLITES						
GENERAL PURPOSE	12 XP	132.00	88.00	88.00	88.00	220.00
	24 XP	224.00	448.00	1309.00	3619.00	3843.00
	12 XP/GS	132.00	88.00	88.00	88.00	220.00
	24 XP/GS	224.00	448.00	1309.00	3619.00	3843.00
DIRECT BROADCAST	MAIN	0.00	22.00	154.00	544.00	544.00
	GROUND SPARE	0.00	22.00	154.00	544.00	544.00
EARTH STATIONS						
MAIN		42.62	10.00	16.16	23.86	66.48
REGIONAL		128.46	9.02	64.10	189.56	318.02
SMALL		76.50	419.50	1304.50	6671.50	6748.00
TV/RO		92.40	295.30	545.88	858.95	951.35
DIRECT BROADCAST		0.00	21.93	87.56	2887.83	2887.83
NON HARDWARE						
PLANNING (EQ. UNITS)		10.00	1.70	4.00	11.50	21.50
LAUNCH (EQ. UNITS)		278.40	418.40	1026.40	2582.40	2860.80
TURNKEY (EQ. UNITS)						
MAIN		1.16	0.00	0.00	0.00	1.16
REGIONAL		5.78	0.40	1.03	1.24	7.01
SMALL		10.91	2.82	2.82	2.82	13.73
TV/RO		0.11	0.08	0.22	0.37	0.48
OPERATION (EQ. UNITS)		12.00	12.00	27.00	57.00	69.00
TOTAL		1370.32	2307.15	6181.67	21789.02	23159.35

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
CUMULATIVE AFTER 1981

(1980 *DOLLARS*)

SOUTH AMERICA

		1981	1985	1990	2000	*TOTAL*
SATELLITES						
GENERAL PURPOSE	12 *XP*	0.00	66.00	88.00	88.00	88.00
	24 *XP*	0.00	28.00	28.00	203.00	203.00
	12 *XP/GS*	0.00	66.00	88.00	88.00	88.00
	24 *XP/GS*	0.00	28.00	28.00	203.00	203.00
DIRECT BROADCAST MAIN		0.00	0.00	0.00	30.00	30.00
	GROUND SPARE	0.00	0.00	0.00	30.00	30.00
EARTH STATIONS						
MAIN		0.00	0.00	0.00	0.00	0.00
REGIONAL		0.00	14.28	15.30	16.32	16.32
SMALL		0.00	14.50	23.50	36.50	36.50
TV/RO		0.00	4.93	7.53	12.80	12.80
DIRECT BROADCAST		0.00	0.00	0.00	115.77	115.77
NON HARDWARE						
PLANNING (EQ. UNITS)		6.00	21.00	21.00	21.00	27.00
LAUNCH (EQ. UNITS)		0.00	78.40	92.40	176.40	176.40
TURNKEY (EQ. UNITS)						
MAIN		0.00	0.00	0.00	0.00	0.00
REGIONAL		0.00	3.57	3.83	4.08	4.08
SMALL		0.00	3.59	5.92	9.10	9.10
TV/RO		0.00	1.28	1.95	3.33	3.33
OPERATION (EQ. UNITS)		0.00	7.50	30.00	49.50	49.50
TOTAL		6.00	337.05	433.42	1086.80	1092.80

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
CUMULATIVE AFTER 1981

(1980 DOLLARS)

EUROPE

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	22.00	22.00	22.00	22.00
24 XP	0.00	140.00	168.00	413.00	413.00
12 XP/GS	0.00	22.00	22.00	22.00	22.00
24 XP/GS	0.00	140.00	168.00	413.00	413.00
DIRECT BROADCAST MAIN	0.00	22.00	110.00	260.00	260.00
GROUND SPARE	0.00	22.00	110.00	260.00	260.00
EARTH STATIONS					
MAIN	9.24	24.64	30.80	30.80	40.04
REGIONAL	12.24	42.84	82.62	150.96	163.20
SMALL	50.00	258.00	446.00	741.00	791.00
TV/RO	5.35	16.18	37.23	140.80	146.15
DIRECT BROADCAST	0.00	51.91	307.09	1901.43	1901.43
NON HARDWARE					
PLANNING (EQ. UNITS)	0.00	0.00	0.00	0.00	0.00
LAUNCH (EQ. UNITS)	0.00	0.00	0.00	0.00	0.00
TURNKEY (EQ. UNITS)					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	0.00	0.00	0.00	0.00
SMALL	0.00	0.00	0.00	0.00	0.00
TV/RO	0.00	0.00	0.00	0.00	0.00
OPERATION (EQ. UNITS)	0.00	0.00	0.00	0.00	0.00
TOTAL	76.83	761.56	1503.74	4354.99	4431.82

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
CUMULATIVE AFTER 1981

(1980 DOLLARS)

AFRICA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	0.00	44.00	74.00	74.00
24 XP	0.00	28.00	84.00	189.00	189.00
12 XP/GS	0.00	0.00	44.00	74.00	74.00
24 XP/GS	0.00	28.00	84.00	189.00	189.00
DIRECT BROADCAST MAIN	0.00	0.00	0.00	0.00	0.00
GROUND SPARE	0.00	0.00	0.00	0.00	0.00
EARTH STATIONS					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	7.14	24.48	25.50	25.50
SMALL	0.00	4.00	16.50	27.50	27.50
TV/RO	0.00	0.85	2.05	3.73	3.73
DIRECT BROADCAST	0.00	0.00	0.00	0.00	0.00
NON HARDWARE					
PLANNING (EQ. UNITS)	3.00	9.00	24.00	24.00	27.00
LAUNCH (EQ. UNITS)	0.00	19.60	75.60	131.60	131.60
TURNKEY (EQ. UNITS)					
MAIN	0.00	0.00	0.00	0.00	0.00
REGIONAL	0.00	1.79	5.99	6.25	6.25
SMALL	0.00	1.06	4.08	6.83	6.83
TV/RO	0.00	0.22	0.53	0.97	0.97
OPERATION (EQ. UNITS)	0.00	3.00	16.50	45.00	45.00
TOTAL	3.00	102.65	425.74	797.37	800.37

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
CUMULATIVE AFTER 1981

(1980 DOLLARS)

ASIA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	88.00	132.00	132.00	132.00
24 XP	84.00	196.00	336.00	861.00	945.00
12 XP/GS	0.00	88.00	132.00	132.00	132.00
24 XP/GS	84.00	196.00	336.00	861.00	945.00
DIRECT BROADCAST MAIN	0.00	0.00	66.00	156.00	156.00
GROUND SPARE	0.00	0.00	66.00	156.00	156.00
EARTH STATIONS					
MAIN	7.70	3.08	3.08	3.08	10.78
REGIONAL	52.02	55.08	85.68	131.58	183.60
SMALL	175.00	191.00	335.50	429.50	604.50
TV/RO	30.25	38.63	104.08	267.90	298.15
DIRECT BROADCAST	0.00	0.00	494.41	4048.66	4048.66
NON HARDWARE					
PLANNING (EQ. UNITS)	9.00	18.00	27.00	27.00	36.00
LAUNCH (EQ. UNITS)	0.00	156.80	226.80	352.80	352.80
TURNKEY (EQ. UNITS)					
MAIN	0.00	0.77	0.77	0.77	0.77
REGIONAL	0.26	10.64	14.33	18.83	19.09
SMALL	0.31	27.47	46.32	69.83	70.14
TV/RO	0.02	4.17	7.31	19.88	19.91
OPERATION (EQ. UNITS)	0.00	6.00	13.50	27.00	27.00
TOTAL	442.56	1079.64	2426.78	7694.84	8237.40

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
REGIONAL
CUMULATIVE AFTER 1981

(1980 DOLLARS)

OCEANIA

	1981	1985	1990	2000	TOTAL
SATELLITES					
GENERAL PURPOSE 12 XP	0.00	66.00	66.00	66.00	66.00
24 XP	0.00	0.00	0.00	105.00	105.00
12 XP/GS	0.00	66.00	66.00	66.00	66.00
24 XP/GS	0.00	0.00	0.00	105.00	105.00
DIRECT BROADCAST MAIN	0.00	0.00	44.00	104.00	104.00
GROUND SPARE	0.00	0.00	44.00	104.00	104.00
EARTH STATIONS					
MAIN	0.00	4.62	4.62	4.62	4.62
REGIONAL	0.00	11.22	19.38	24.48	24.48
SMALL	0.00	20.00	32.00	52.50	52.50
TV/RO	0.00	0.55	1.00	3.55	3.55
DIRECT BROADCAST	0.00	0.00	19.12	118.41	118.41
NON HARDWARE					
PLANNING (EQ. UNITS)	3.00	6.00	6.00	6.00	9.00
LAUNCH (EQ. UNITS)	0.00	58.80	86.80	156.80	156.80
TURNKEY (EQ. UNITS)					
MAIN	0.00	1.16	1.16	1.16	1.16
REGIONAL	0.00	2.69	4.90	6.10	6.10
SMALL	0.00	5.03	7.98	13.09	13.09
TV/RO	0.00	0.14	0.26	0.93	0.93
OPERATION (EQ. UNITS)	0.00	3.00	10.50	10.50	10.50
TOTAL	3.00	245.21	413.72	948.13	951.13

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
TOTAL
CUMULATIVE AFTER 1981

(1980 *DOLLARS*)

	1981	1985	1990	2000	*TOTAL*
SATELLITES					
GENERAL PURPOSE 12 *XP*	132.00	330.00	440.00	470.00	602.00
24 *XP*	308.00	840.00	1925.00	5390.00	5698.00
12 *XP/GS*	132.00	330.00	440.00	470.00	602.00
24 *XP/GS*	308.00	840.00	1925.00	5390.00	5698.00
DIRECT BROADCAST MAIN	0.00	44.00	374.00	1094.00	1094.00
GROUND SPARE	0.00	44.00	374.00	1094.00	1094.00
EARTH STATIONS					
MAIN	58.56	42.34	54.66	62.36	121.92
REGIONAL	192.72	139.58	291.56	538.40	731.12
SMALL	301.50	907.00	2158.00	7958.50	8260.00
TV/RO	128.00	356.43	697.75	1287.73	1415.73
DIRECT BROADCAST	0.00	73.83	908.19	9072.09	9072.09
NON HARDWARE					
PLANNING (EQ. UNITS)	31.00	55.70	82.00	89.50	120.50
LAUNCH (EQ. UNITS)	278.40	732.00	1508.00	3400.00	3678.40
TURNKEY (EQ. UNITS)					
MAIN	1.16	1.93	1.93	1.93	3.08
REGIONAL	6.03	19.09	30.08	36.49	42.52
SMALL	11.22	39.96	67.12	101.67	112.89
TV/RO	0.13	5.89	10.28	25.48	25.61
OPERATION (EQ. UNITS)	12.00	31.50	97.50	189.00	201.00
TOTAL	1901.71	4833.25	11385.07	36671.14	38572.86

ORIGINAL PAGE IS
OF POOR QUALITY

3.12 COUNTRY REPORT

These reports contain country satellite system status, shown on the two printouts that follow.

Countries having a domestic satellite system are listed first and are indicated by a "D." Regional satellite systems follow are are indicated by a regional number. Countries designated "P" are primary regional sponsors. They are the primary reason for the existence of that regional system. Earth station growth rates for non-primary regional countries are only one half the growth rate for other countries. All units are cumulative after 1981. If a country has both a domestic satellite system and is part of a regional satellite system its earth stations will only be given once as a part of the domestic system.

COUNTRY STATUS REPORT FOR 2000 - MOST LIKELY

	REGION		SATELLITES			EARTH STATIONS				
			GP/12	GP/24	DB	MAIN	REGIONAL	SMALL	TV/RO	DB
CANADA	D		3	5	2	3	28	110	74	675650
MEXICO	D				1	0	2	14	134	160786
CHINA	D		2	1		0	3	42	178	0
INDIA	D		2	3	1	0	3	49	470	4377164
JAPAN	D			4	2	3	42	395	1792	1920485
PAKISTAN	D		1			0	2	8	47	0
SOVIET UNION	D			1		5	78	648	4244	0
UNITED STATES	D		7	102	15	40	310	51000	37000	3990000
MEXICO	P	1		2		0	0	0	0	0
BOLIVIA		1				0	1	2	2	0
CHILE		1				0	1	7	13	0
COLOMBIA		1				0	1	4	21	0
ECUADOR		1				0	1	2	8	0
PERU		1				0	1	6	12	0
VENEZUALA		1				0	1	3	21	0
BRAZIL	P	2	1	1		0	2	23	213	0
ARGENTINA		2				0	1	3	37	0
URAGUAY		2				0	1	2	8	0
DENMARK	P	3		2	4	1	4	46	38	82636
FINLAND	P	3				1	4	31	35	77003
ICELAND	P	3				0	1	1	4	3707
NORWAY	P	3				1	6	34	48	66058
SWEDEN	P	3				1	7	58	120	134298
FRANCE	P	4		4	2	2	25	204	1332	864591
WEST GERMANY	P	4				2	31	312	995	975136
BELGIUM		4				1	3	32	20	0
LUXEMBOURG		4				1	0	2	2	0
PORTUGAL		4				1	2	9	55	0
SPAIN		4				1	5	60	129	0
SWITZERLAND		4				1	4	39	2	0
UNITED KINGDOM		4				1	11	151	97	0
CAMEROON		4				0	1	1	1	0
CONGO		4				0	1	1	1	0
GABON		4				0	1	0	1	0
IVORY COAST		4				0	1	1	5	0
NIGERIA		4				0	1	0	0	0
SENEGAL		4				0	1	2	2	0
TOGO		4				0	1	1	1	0
ITALY	P	5	1	1	2	2	21	182	1534	1599424
AUSTRIA		5				1	2	11	19	0
TURKEY		5				0	1	4	60	0
ALGERIA	P	6		4		0	3	8	55	0
SAUDI ARABIA	P	6				0	3	5	24	0
LIBYA		6				0	1	1	2	0

ORIGINAL PAGE IS
OF POOR QUALITY

COUNTRY STATUS REPORT FOR 2000 - MOST LIKELY

	REGION	SATELLITES			EARTH STATIONS				
		GP/12	GP/24	DB	MAIN	REGIONAL	SMALL	TV/RO	IM
MAURITANIA		6			0	1	0	0	0
MOROCCO		6			0	1	2	13	0
SUDAN		6			0	1	3	7	0
TUNISIA		6			0	1	1	0	0
BAHRAIN		6			0	1	1	0	0
IRAN		6			0	1	10	17	0
IRAQ		6			0	1	2	9	0
JORDAN		6			0	1	2	7	0
KUWAIT		6			0	1	2	1	0
LEBANON		6			0	1	1	2	0
OMAN		6			0	1	0	1	0
QATAR		6			0	1	0	0	0
SYRIA		6			0	1	1	4	0
UNITED ARAB EMIRATES		6			0	1	1	1	0
YEMEN ARAB REPUBLIC		6			0	1	1	1	0
INDONESIA	P	7		4	0	3	15	120	0
MALAYASIA		7			0	1	5	18	0
PHILLIPINES		7			0	1	6	39	0
SINGAPORE		7			0	1	0	0	0
SOUTH KOREA		7			0	1	4	11	0
THAILAND		7			0	1	3	23	0
PAPUA NEW GUINEA		7			0	1	1	2	0
AUSTRALIA	P	8	3	3	2	3	22	101	146	197349
NEW ZEALAND		8				0	1	3	11	0
KENYA	P	10	1			0	2	2	4	0
NIGERIA	P	10				0	3	25	35	0
GHANA		10				0	1	2	4	0
LIBERIA		10				0	1	0	0	0
NIGER		10				0	1	1	1	0
UGANDA		10				0	1	1	3	0
SOVIET UNION	P	40		5		0	0	0	0	0
CZECHOSLOVAKIA		40				1	3	26	42	0
EAST GERMANY		40				1	3	26	45	0
HUNGARY		40				1	3	16	28	0
POLAND		40				1	3	42	123	0
RUMANIA		40				1	3	24	75	0
YUGOSLAVIA		40				1	3	22	98	0
AFGHANISTAN		40				0	1	3	6	0
TOTAL			21	142	31	77	693	53351	49774	15124288

ORIGINAL PAGE IS
OF POOR QUALITY

COUNTRY STATUS REPORT FOR 2000 - OPTIMISTIC

		REGION	SATELLITES			EARTH STATIONS				
			CP/12	CP/24	DB	MAIN	REGIONAL	SMALL	TV/RO	DB
CANADA	D		3	9	2	3	28	110	74	675650
MEXICO	D			2	1	0	3	15	134	231532
WEST GERMANY	D			3	2	2	31	312	995	975136
CHINA	D		2	2	1	0	3	42	178	924242
INDIA	D		3	4	1	0	3	47	476	5252597
JAPAN	D			5	4	2	84	395	2012	1920485
PAKISTAN	D		1	1		0	2	9	57	0
UNITED STATES	D		7	106	18	41	351	111550	38000	5100000
COLOMBIA	P	1	2	2		0	3	9	57	0
BOLIVIA		1				0	1	2	2	0
CHILE		1				0	1	7	19	0
ECUADOR		1				0	1	2	8	0
PERU		1				0	1	6	12	0
VENEZUALA		1				0	1	9	21	0
BRAZIL	P	2	2	2		0	3	23	213	0
ARGENTINA		2				0	1	3	37	0
URAGUAY		2				0	1	2	8	0
DENMARK	P	3		2	4	1	5	46	50	82636
FINLAND	P	3				1	4	31	59	77003
ICELAND	P	3				0	1	1	5	3707
NORWAY	P	3				1	6	34	64	66058
SWEDEN	P	3				1	7	58	159	134298
PORTUGAL	P	4		2		2	14	23	198	0
SPAIN	P	4				2	13	150	464	0
FRANCE	P	5		5	2	3	25	284	1332	864591
BELGIUM		5				1	3	32	20	0
LUXEMBOURG		5				1	0	2	2	0
SWITZERLAND		5				1	4	39	2	0
UNITED KINGDOM		5				1	11	151	97	0
CAMEROON	P	6	2			0	3	2	2	0
CONGO		6				0	1	1	1	0
GABON		6				0	1	0	1	0
IVORY COAST		6				0	1	1	4	0
NIGERIA		6				0	1	0	0	0
SENEGAL		6				0	1	2	2	0
TOGO		6				0	1	1	1	0
ITALY	P	7	1	1	2	2	21	182	1534	1599424
AUSTRIA		7				1	2	11	19	0
TURKEY		7				0	1	4	60	0
ALGERIA	P	8		5		0	3	8	55	0
SAUDI ARABIA	P	8				0	3	5	24	0
LIBYA		8				0	1	1	2	0

ORIGINAL PAGE IS
OF POOR QUALITY

COUNTRY STATUS REPORT FOR 2000 - OPTIMISTIC

		REGION	SATELLITES			EARTH STATIONS				
			GP/12	GP/24	DB	MAIN	REGIONAL	SMALL	TV/HO	UN
MAURITANIA		8				0	1	0	4	0
MOROCCO		8				0	1	2	13	0
SUDAN		8				0	1	3	7	0
TUNISIA		8				0	1	1	0	0
BAHRAIN		8				0	1	1	0	0
IRAN		8				0	1	10	17	0
IRAQ		8				0	1	2	9	0
JORDAN		8				0	1	2	7	0
KUWAIT		8				0	1	2	1	0
LEBANON		8				0	1	1	2	0
OMAN		8				0	1	0	1	0
QATAR		8				0	1	0	0	0
SYRIA		8				0	1	1	4	0
UNITED ARAB EMIRATES		8				0	1	1	1	0
YEMEN ARAB REPUBLIC		8				0	1	1	1	0
INDONESIA	P	9		5		0	2	16	120	0
MALAYASIA		9				0	1	5	18	0
PHILLIPINES		9				0	1	6	39	0
SINGAPORE		9				0	1	0	0	0
SOUTH KOREA		9				0	1	4	11	0
THAILAND		9				0	1	3	23	0
PAPUA NEW GUINEA		9				0	1	1	2	0
KENYA	P	10	1	1		0	2	2	4	0
NIGERIA	P	10				0	3	26	47	0
GHANA		10				0	1	2	5	0
LIBERIA		10				0	1	0	0	0
UGANDA		10				0	1	1	3	0
AUSTRALIA	P	11	3	3	4	3	22	101	130	236819
NEW ZEALAND		11				0	1	3	11	0
SOVIET UNION	P	40		13		5	105	648	8863	0
CZECHOSLOVAKIA		40				1	4	36	87	0
EAST GERMANY		40				1	4	38	92	0
HUNGARY		40				1	3	23	58	0
POLAND		40				1	5	61	253	0
ROMANIA		40				1	3	36	155	0
YUGOSLAVIA		40				1	4	32	201	0
AFGHANISTAN		40				0	1	3	6	0
TOTAL			27	173	41	80	783	114683	56649	18144179

ORIGINAL PAGE IS
OF POOR QUALITY

3.13 TOTAL WORLD SATELLITE TELECOMMUNICATION MARKET

The following computer printouts are summary reports of the total world satellite telecommunications market.

SATELLITE UNITS — WORLD REGIONS BETWEEN 1981-2000

Most Likely

	NA	SA	Europe	Africa	Asia	Oceania	Tota
Earth Segment							
Intelsat	5	11	15	10	20	3	64
A							
B		6	6	20	6	6	44
C	10	22	32	20	41	5	130
N/S		275	95	645	379	69	1463
Domestic							
Main (Large Main)*	15	0	23	0	8	3	49
Regional (Medium Main)	212	12	143	24	152	24	693
Small (Industrial)	50473	67	1406	53	1210	105	53314
RO	33358	476	4850	138	7077	159	46058
Direct Broadcast	4665650	160786	3802853	0	6297649	197349	15124287
Space Segment							
Intelsat (world)							
Primary							31
Spare							9
Domestic							
General Purpose							
small	10	1	1	1	5	2	21
large	107	3	7	4	15	2	142
Spare (small)	10	1	1	1	5	2	21
(large)	107	3	7	4	15	2	142
Direct Broadcast	17	1	8	0	3	0	31
Spare	17	1	8	0	3	0	31

* U.S. terms in parentheses

ORIGINAL PAGE IS OF POOR QUALITY

SATELLITE UNITS - WORLD REGIONS BETWEEN 1981-2000

Optimistic

	NA	SA	Europe	Africa	Asia	Oceania	Total
Earth Segment							
Intelsat							
A	8	16	47	30	61	8	170
B	0	5	15	51	15	15	101
C	6	12	113	72	147	19	369
N/S	0	730	274	1869	1100	202	4175
Domestic							
Main (Large Main)*	16	0	20	0	2	3	41
Regional (Medium Main)	253	16	148	25	129	24	595
Small (Industrial)	111023	73	1482	55	859	105	113597
RO	34358	512	5632	149	10716	142	51509
Direct Broadcast	5775650	231532	3802853	0	8097324	236819	18144178
Space Segment							
Intelsat (world)							
Primary							43
Spare							10
Domestic							
General Purpose							
small	4	4	1	3	6	3	21
large	107	6	13	6	27	3	162
Spare (small)	4	4	1	3	6	3	21
(large)	107	6	13	6	27	3	162
Direct Broadcast	20	1	10	0	6	4	41
Spare	20	1	10	0	6	4	41

ORIGINAL PAGE IS OF POOR QUALITY

ORIGINAL PAGE IS
OF POOR QUALITY

MOST LIKELY
MILLIONS - 1980 US DOLLARS
DELTA

TOTAL WORLD TELECOMMUNICATIONS MARKET

	1981	1985	1990	2000	TOTAL
NORTH AMERICA					
INTEL ES EXPENDITURES	75.60	16.90	8.90	37.00	138.40
DOM SPACE EXPENDITURES	712.00	1004.00	1790.00	5010.00	8516.00
DOM ES EXPENDITURES	341.04	755.73	1131.43	4557.46	6785.66
DOM NON-HARDWARE EXPENDITURES	318.34	396.20	562.48	1479.35	2756.37
TOTAL	1446.98	2172.83	3492.80	11083.81	18196.43
SOUTH AMERICA					
INTEL ES EXPENDITURES	210.60	88.00	98.80	375.00	772.40
DOM SPACE EXPENDITURES		100.00		200.00	300.00
DOM ES EXPENDITURES		29.72	11.23	97.09	138.03
DOM NON-HARDWARE EXPENDITURES		67.67	17.79	55.26	140.71
TOTAL	210.60	285.38	127.82	727.35	1351.15
EUROPE					
INTEL ES EXPENDITURES	243.30	65.90	62.00	221.30	592.50
DOM SPACE EXPENDITURES		200.00	188.00	520.00	908.00
DOM ES EXPENDITURES		352.51	545.53	2008.92	2906.96
DOM NON-HARDWARE EXPENDITURES					
TOTAL	243.30	618.41	795.53	2750.22	4407.46
AFRICA					
INTEL ES EXPENDITURES	296.20	34.50	333.40	781.40	1445.50
DOM SPACE EXPENDITURES		56.00	56.00	200.00	312.00
DOM ES EXPENDITURES		22.28	3.47	28.68	54.43
DOM NON-HARDWARE EXPENDITURES	3.00	34.24	25.33	67.09	129.67
TOTAL	299.20	147.02	418.20	1077.17	1941.60
ASIA					
INTEL ES EXPENDITURES	359.60	135.10	146.70	551.70	1193.10
DOM SPACE EXPENDITURES	168.00	344.00	212.00	810.00	1534.00
DOM ES EXPENDITURES		163.53	486.15	3448.43	4098.11
DOM NON-HARDWARE EXPENDITURES	49.60	191.72	86.60	186.54	514.46
TOTAL	577.20	834.35	931.46	4996.67	7339.67

MOST LIKELY
MILLIONS - 1980 US DOLLARS
DELTA

TOTAL WORLD TELECOMMUNICATIONS MARKET

	1981	1985	1990	2000	TOTAL
OCEANIA					
INTEL ES EXPENDITURES	43.80	24.10	27.70	102.60	198.20
DOM SPACE EXPENDITURES		132.00	156.00	130.00	418.00
DOM ES EXPENDITURES		39.49	37.60	107.17	184.25
DOM NON-HARDWARE EXPENDITURES	6.00	76.31	53.26	34.24	169.80
TOTAL	49.80	271.89	274.56	374.00	970.25
INTELSAT SPACE					
SATELLITE	360.00	396.00	550.00	1360.00	2666.00
LAUNCH		90.00	240.00	700.00	1030.00
TOTAL	360.00	486.00	790.00	2060.00	3696.00
GRAND TOTALS					
INTELSAT EXP	1229.10	364.50	677.50	2069.00	4340.10
DOM SPACE	880.00	1836.00	2402.00	6870.00	11988.00
DOM ES	341.04	1363.24	2215.41	10247.75	14167.43
DOM NON HARDWARE	376.94	766.14	745.46	1822.47	3711.02
INTELSAT SPACE	360.00	486.00	790.00	2060.00	3696.00
TOTAL	3187.08	4815.88	6830.37	23069.22	37902.55

ORIGINAL PAGE IS
OF POOR QUALITY

MOST LIKELY
MILLIONS - 1980 US DOLLARS
CUMULATIVE AFTER 1981

TOTAL WORLD TELECOMMUNICATIONS MARKET

	1981	1985	1990	2000	TOTAL
NORTH AMERICA					
INTEL ES EXPENDITURES	75.60	16.90	25.80	62.80	138.40
DOM SPACE EXPENDITURES	712.00	1004.00	2794.00	7804.00	8516.00
DOM ES EXPENDITURES	341.04	755.73	1887.16	6444.62	6785.66
DOM NON-HARDWARE EXPENDITURES	318.34	396.20	958.68	2438.03	2756.37
TOTAL	1446.98	2172.83	5665.63	16749.44	18196.43
SOUTH AMERICA					
INTEL ES EXPENDITURES	210.60	88.00	186.80	561.80	772.40
DOM SPACE EXPENDITURES		100.00	100.00	300.00	300.00
DOM ES EXPENDITURES		29.72	40.94	138.03	138.03
DOM NON-HARDWARE EXPENDITURES		67.67	85.46	140.71	140.71
TOTAL	210.60	285.38	413.20	1140.55	1351.15
EUROPE					
INTEL ES EXPENDITURES	243.30	65.90	127.90	349.20	592.50
DOM SPACE EXPENDITURES		200.00	388.00	908.00	908.00
DOM ES EXPENDITURES		352.51	898.04	2906.96	2906.96
DOM NON-HARDWARE EXPENDITURES					
TOTAL	243.30	618.41	1413.94	4164.16	4407.46
AFRICA					
INTEL ES EXPENDITURES	296.20	34.50	367.90	1149.30	1445.50
DOM SPACE EXPENDITURES		56.00	112.00	312.00	312.00
DOM ES EXPENDITURES		22.28	25.75	54.43	54.43
DOM NON-HARDWARE EXPENDITURES	3.00	34.24	59.57	126.67	129.67
TOTAL	299.20	147.02	565.22	1642.40	1941.60
ASIA					
INTEL ES EXPENDITURES	359.60	135.10	281.80	833.50	1193.10
DOM SPACE EXPENDITURES	168.00	344.00	556.00	1366.00	1534.00
DOM ES EXPENDITURES		163.53	649.68	4098.11	4098.11
DOM NON-HARDWARE EXPENDITURES	49.60	191.72	278.33	464.86	514.46
TOTAL	577.20	834.35	1765.81	6762.47	7339.67

ORIGINAL PAGE IS
OF POOR QUALITY

MOST LIKELY
MILLIONS - 1980 US DOLLARS
CUMULATIVE AFTER 1981

TOTAL WORLD TELECOMMUNICATIONS MARKET

	1981	1985	1990	2000	TOTAL
OCEANIA					
INTEL ES EXPENDITURES	43.80	24.10	51.80	154.40	198.20
DOM SPACE EXPENDITURES		132.00	288.00	418.00	418.00
DOM ES EXPENDITURES		39.49	77.08	184.25	184.25
DOM NON-HARDWARE EXPENDITURES	6.00	76.31	129.57	163.80	169.80
TOTAL	49.80	271.89	546.45	920.45	970.25
INTELSAT SPACE					
SATELLITE	360.00	396.00	946.00	2306.00	2666.00
LAUNCH		90.00	330.00	1030.00	1030.00
TOTAL	360.00	486.00	1276.00	3336.00	3696.00
GRAND TOTALS					
INTELSAT EXP	1229.10	364.50	1042.00	3111.00	4340.10
DOM SPACE	880.00	1836.00	4238.00	11108.00	11988.00
DOM ES	341.04	1363.24	3578.64	13826.39	14167.43
DOM NON HARDWARE	376.94	766.14	1511.60	3334.08	3711.02
INTELSAT SPACE	360.00	486.00	1276.00	3336.00	3696.00
TOTAL	3187.08	4815.88	11646.24	34715.47	37902.55

OPTIMISTIC
MILLIONS - 1980 US DOLLARS
DELTA

ORIGINAL PAGE IS
OF POOR QUALITY

TOTAL WORLD TELECOMMUNICATIONS MARKET

	1981	1985	1990	2000	TOTAL
NORTH AMERICA					
INTEL ES EXPENDITURES	75.60	35.40	27.90	143.10	282.00
DOM SPACE EXPENDITURES	712.00	1116.00	1986.00	5400.00	9214.00
DOM ES EXPENDITURES	339.98	755.75	1262.45	8613.50	10971.68
DOM NON-HARDWARE EXPENDITURES	318.34	435.40	626.08	1593.85	2973.67
TOTAL	1445.92	2342.55	3902.42	15750.45	23441.35
SOUTH AMERICA					
INTEL ES EXPENDITURES	210.60	168.50	232.70	74.50	686.30
DOM SPACE EXPENDITURES		188.00	44.00	410.00	642.00
DOM ES EXPENDITURES		33.71	12.62	135.06	181.39
DOM NON-HARDWARE EXPENDITURES	6.00	115.34	39.75	108.31	269.41
TOTAL	216.60	505.55	329.07	727.87	1779.10
EUROPE					
INTEL ES EXPENDITURES	243.30	139.30	152.90	785.00	1320.50
DOM SPACE EXPENDITURES		368.00	232.00	790.00	1390.00
DOM ES EXPENDITURES	76.83	393.56	510.18	2061.25	3041.82
DOM NON-HARDWARE EXPENDITURES					
TOTAL	320.13	900.86	895.08	3636.25	5752.32
AFRICA					
INTEL ES EXPENDITURES	296.20	309.90	457.40	2585.00	3648.50
DOM SPACE EXPENDITURES		56.00	200.00	270.00	526.00
DOM ES EXPENDITURES		11.99	31.04	13.70	56.73
DOM NON-HARDWARE EXPENDITURES	3.00	34.66	92.05	87.94	217.65
TOTAL	299.20	412.55	780.49	2956.63	4448.87
ASIA					
INTEL ES EXPENDITURES	359.60	263.80	350.30	1889.40	2863.10
DOM SPACE EXPENDITURES	168.00	568.00	500.00	1230.00	2466.00
DOM ES EXPENDITURES	264.97	287.79	734.96	3857.97	5145.69
DOM NON-HARDWARE EXPENDITURES	9.59	223.85	112.18	180.09	525.71
TOTAL	802.16	1343.44	1697.44	7157.46	11000.50

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
MILLIONS - 1980 US DOLLARS
DELTA

TOTAL WORLD TELECOMMUNICATIONS MARKET

	1981	1985	1990	2000	TOTAL
OCEANIA					
INTEL ES EXPENDITURES	43.80	45.80	64.90	341.30	495.80
DOM SPACE EXPENDITURES		132.00	88.00	330.00	550.00
DOM ES EXPENDITURES		36.39	39.73	127.44	203.56
DOM NON-HARDWARE EXPENDITURES	3.00	76.82	40.78	76.97	197.57
TOTAL	46.80	291.01	233.42	875.70	1446.93
INTELSAT SPACE					
SATELLITE	360.00	396.00	700.00	2160.00	3616.00
LAUNCH		90.00	360.00	1100.00	1550.00
TOTAL	360.00	486.00	1060.00	3260.00	5166.00
GRAND TOTALS					
INTELSAT EXP	1229.10	962.70	1296.10	5818.30	9296.20
DOM SPACE	880.00	2428.00	3050.00	8430.00	14788.00
DOM ES	631.78	1519.18	2590.98	14808.91	19600.85
DOM NON HARDWARE	339.93	886.07	910.84	2047.16	4184.00
INTELSAT SPACE	360.00	486.00	1060.00	3260.00	5166.00
TOTAL	3490.81	6281.95	8897.93	34364.37	53035.06

ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
MILLIONS - 1980 US DOLLARS
CUMULATIVE AFTER 1981

TOTAL WORLD TELECOMMUNICATIONS MARKET

	1981	1985	1990	2000	TOTAL
NORTH AMERICA					
INTEL ES EXPENDITURES	75.60	35.40	63.30	206.40	282.00
DOM SPACE EXPENDITURES	712.00	1116.00	3102.00	8502.00	9214.00
DOM ES EXPENDITURES	339.98	755.75	2018.20	10631.70	10971.68
DOM NON-HARDWARE EXPENDITURES	318.34	435.40	1061.48	2655.33	2973.67
TOTAL	1445.92	2342.55	6244.97	21995.42	23441.35
SOUTH AMERICA					
INTEL ES EXPENDITURES	210.60	168.50	401.20	475.70	686.30
DOM SPACE EXPENDITURES		188.00	292.00	642.00	642.00
DOM ES EXPENDITURES		33.71	46.33	181.39	181.39
DOM NON-HARDWARE EXPENDITURES	6.00	115.34	155.10	263.41	269.41
TOTAL	216.60	505.55	834.62	1562.50	1779.10
EUROPE					
INTEL ES EXPENDITURES	243.30	139.30	292.20	1077.20	1320.50
DOM SPACE EXPENDITURES		368.00	600.00	1390.00	1390.00
DOM ES EXPENDITURES	76.83	393.56	903.74	2964.99	3041.82
DOM NON-HARDWARE EXPENDITURES					
TOTAL	320.13	900.86	1795.94	5432.19	5752.32
AFRICA					
INTEL ES EXPENDITURES	296.20	309.90	767.30	3352.30	3648.50
DOM SPACE EXPENDITURES		56.00	256.00	526.00	526.00
DOM ES EXPENDITURES		11.99	43.03	56.73	56.73
DOM NON-HARDWARE EXPENDITURES	3.00	34.66	126.71	214.65	217.65
TOTAL	299.20	412.55	1193.04	4149.67	4448.87
ASIA					
INTEL ES EXPENDITURES	359.60	263.80	614.10	2503.50	2863.10
DOM SPACE EXPENDITURES	168.00	568.00	1068.00	2298.00	2466.00
DOM ES EXPENDITURES	264.97	287.79	1022.75	4880.72	5145.69
DOM NON-HARDWARE EXPENDITURES	9.59	223.85	336.03	516.12	525.71
TOTAL	802.16	1343.44	3040.88	10198.34	11000.50

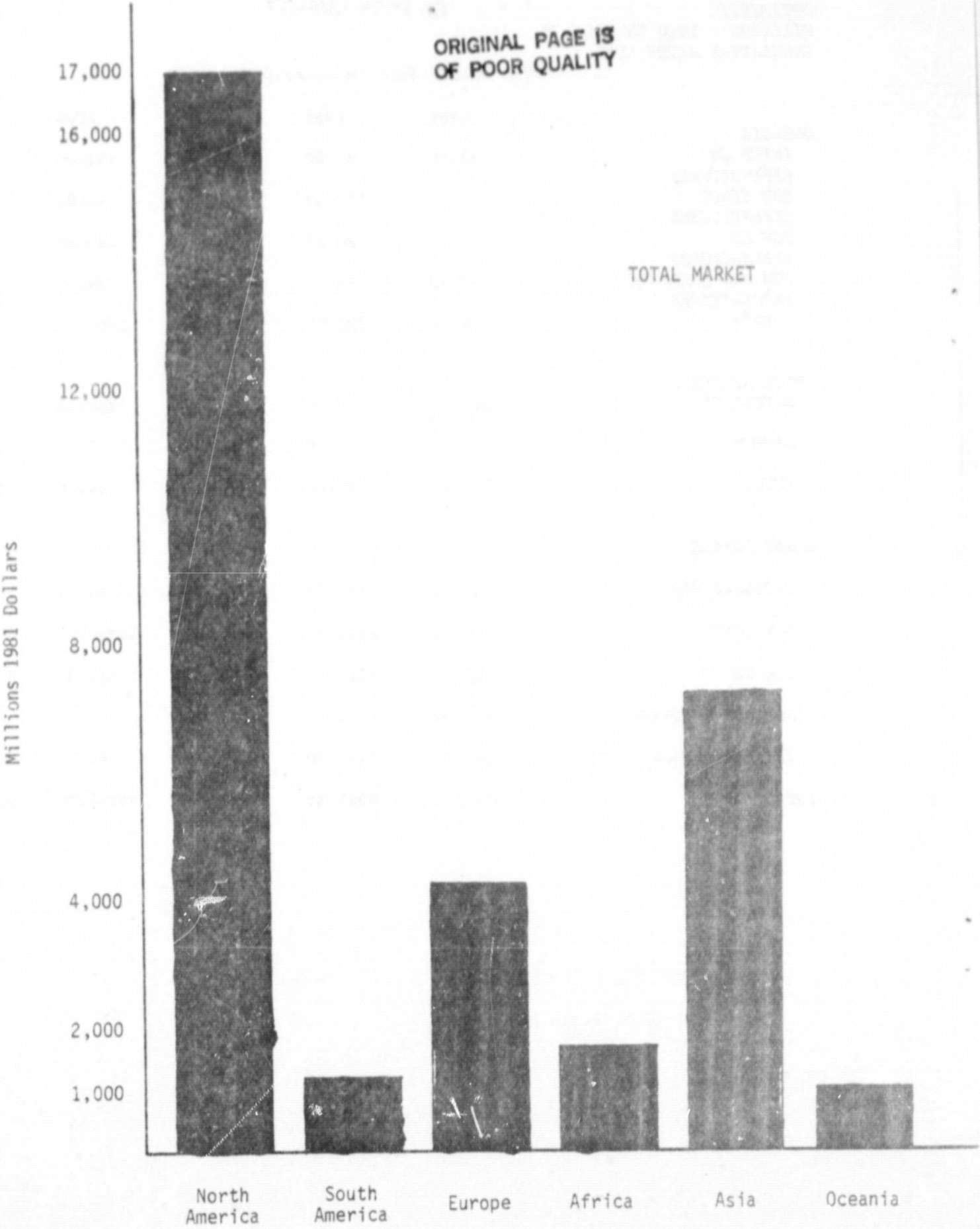
ORIGINAL PAGE IS
OF POOR QUALITY

OPTIMISTIC
MILLIONS - 1980 US DOLLARS
CUMULATIVE AFTER 1981

TOTAL WORLD TELECOMMUNICATIONS MARKET

	1981	1985	1990	2000	TOT
OCEANIA					
INTEL ES EXPENDITURES	43.80	45.80	110.70	452.00	495.
DOM SPAC EXPENDITURES		132.00	220.00	550.00	550.
DOM ES EXPENDITURES		36.39	76.12	203.56	203.
DOM NON-HARDWARE EXPENDITURES	3.00	76.82	117.60	194.57	197.
TOTAL	46.80	291.01	524.42	1400.13	1446.
INTELSAT SPACE					
SATELLITE	360.00	396.00	1096.00	3256.00	3616.
LAUNCH		90.00	450.00	1550.00	1550.
TOTAL	360.00	486.00	1546.00	4806.00	5166.
GRAND TOTALS					
INTELSAT EXP	1229.10	962.70	2248.80	8067.10	9296.
DOM SPACE	880.00	2428.00	5478.00	13908.00	14788.
DOM ES	681.78	1519.18	4110.16	18919.07	19600.
DOM NON HARDWARE	339.93	886.07	1796.91	3344.07	4184.
INTELSAT SPACE	360.00	486.00	1546.00	4806.00	5166.
TOTAL	3490.81	6281.95	15179.87	49544.24	53035.

ORIGINAL PAGE IS
OF POOR QUALITY



SECTION IV
SUMMARY

4.1 WORLD MARKET

The worldwide satellite market demand forecast indicates that the market between 1981 and 2000 will be very large, between $35 and $50 billion. Of this amount between $6 and $14 billion will be spent on Intelsat and related hardware. The balance of the expenditures between $29 and $36 billion will be spent on domestic and regional systems.

4.2 U.S. MARKET

Approximately one half of the world market will be within the United States, between $16 and $20 billion. Information gathered during this review reveals that competition for this and the rest of the world satellite market will be keen with Japan and some European countries. Obviously the U.S. should protect its share of the market, especially within the U.S. This will require the U.S. to maintain its technological lead in this area.