

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS  
THE REPUBLIC OF THE PHILIPPINES

A STUDY  
ON  
THE IMPROVEMENT AND OPTIMIZATION  
OF  
TELECOMMUNICATIONS NETWORKS  
IN  
THE REPUBLIC OF THE PHILIPPINES

MAIN REPORT

March 1994

NTT INTERNATIONAL CORPORATION  
TOKYO, JAPAN

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## PREFACE

In response to a request from the Government of the Republic of the Philippines, the Government of Japan decided to conduct a master plan study on the Improvement and Optimization of Telecommunications Networks in the Republic of the Philippines and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Philippines a study team headed by Mr. Shiro Tamura, NTT International Corporation, three times between June 1993 and March 1994.

The team held discussions with the officials concerned of the Government of the Philippines, and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of the Philippines for their close cooperation extended to the team.

March 1994



Kensuke Yanagiya

President

Japan International Cooperation Agency



March 1994

Mr. Kensuke Yanagiya  
President  
Japan International Cooperation Agency

### Letter of Transmittal

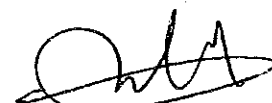
We are pleased to submit to you the study report on the Improvement and Optimization of Telecommunications Networks in the Republic of the Philippines.

This study was conducted by NTT International Corporation, under a contract to JICA, during the period of June 1993 to March 1994. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of the Philippines, and formulated the most appropriate master plan up to the year 2010, covered the whole territory of the Philippines, including guidelines, network and facilities plans, operation and maintenance plan, implementation plans, cost estimation and project evaluation, and recommendations.

We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, and other authorities concerned of the Government of Japan. We would also like to express our gratitude to the officials concerned of the DOTC, other related agencies of the Government of the Philippines, the JICA Philippines Office, and the Embassy of Japan in the Philippines for their cooperation and assistance throughout our study.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,



Ichiro Yamanouchi

President

NTT International Corporation

In this report, project cost is estimated at October 1993 price and at an exchange rate of 1US\$ = 25 Peso.



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**CHAPTER 16 RECOMMENDATIONS**



## ACRONYMS AND ABBREVIATIONS

2-M b/s Paths	2 Megabits per second Paths
2M-IF	2 Megabits Interface
AAB	Automatic Alternative Billing
ADB	Asian Development Bank
AMPS-B	Advanced Mobile Phone System - B
ASEAN	Association of Southeast Asian Nations
BER	Bit Error Rate
B-ISDN	Broad Band ISDN
BOI	Board of Investments
CAPWIRE	Capitol Wireless, Inc.
CCITT	The International Consultative Committee on Telephone and Telegraph
CCS No.7	Common Channel Signaling No.7
CEP	Connection Set-up Error Probability
CFP	Connection Set-up Failure Probability
CLASS	Customer Local Area Signaling Service
CLR	Circuit Loudness Rating
CMTS	Cellular Mobile Telephone System
CPCN	Certificate of Public Convenience and Necessity
CRE	Corrected Reference Equivalents
CSCT	Circuit-Switched Connection Type
CT-2	Cordless Telephone-2
DDD	Direct Distance Dialing
DECT	Digital European Cordless Telecommunications
DIGIPAGE	T.N.Romasanta, Inc.
DIGITEL	Digital Telecommunications Philippines, Inc.
Domsat	Domestic Satellite Philippine Corporation.
DOTC	Department of Transportation and Communications
DR	Digital Radio System
DTI	Department of Trade and Industry
E.O	Executive Order
EAMPS-B	Expand Advanced Mobile Phone System - B
EASYCALL	Easy Call Philippines, Inc
EEC	European Economic Community
EIRR	Economic Internal Rate of Return

ETPI	Eastern Telecoms (Phils),Inc.
EXTELCOM	Express Telecommunications Company, Inc.
O/F	Optical Fiber Cable System
FIRR	Financial Internal Rate of Return
FM-SCPC	Frequency Modulation - Single Channel Per Carrier
FPLMTS	Future Public Land Mobile Telecommunications System
GDP	Gross Domestic Product
Globe Telecom	Globe-Mackey Cable and Radio Corporation.
GSM	Groupe Speciale Mobile
ICC	International Communication Corp.
IN	Intelligent Network
INTS	International Transit Switch
IOMC	Integrated Operation and Maintenance Center
IRC	International Record Carrier
ISDN	Integrated Services Digital Network
ISLA	Isla communications Company, Inc.
ITU	International Telecommunication Union
ITU-R	International Telecommunication Union -Radiocommunication Sector
JF	Jelly Filled
JICA	Japan International Cooperation Agency
JLR	Junction Loudness Rating
JNMC	Junction Network Monitoring Center
KDC	Key Development Center
LBNI	Liberty Broadcasting Network, Inc.
LCR	Line Condition Report
LE	Local Exchange
LR	Loudness Rating
LTC	Last Trunk Capacity
MARCAPI	Maritime Radio Communication Association of the Philippines, Inc.
MC	Memorandum Circular
MCC	Management and Control Center
MDF	Main Distribution Frame
MTIE	Maximum Time Interval Error
MTPDP	Medium-Term Philippine Development Plan
MTPO	Municipal Telephone Project Office
MUC	Major Urban Center
N-ISDN	Narrow band ISDN

NCR	National Capital Region
NEDA	National Economics Development Authority
NMCP	Network Management and Control Point
NNI	Network Node Interface
NPA	Numbering Plan Area
NSCB	National Statistical Coordination Board
NSP	Network Service Control Point
NSSP	Network Service Support Point
NTC	National Telecommunications Commission
NTDP	National Telecommunications Development Plan
NTP	National Telephone Program
OAM	Enhanced Operations, Administration and Maintenance
ODA	Official Development Assistance
OLR	Overall Loudness Rating
OMC	Operation and Maintenance Center
OOF	Other Official Flow
P-ISDN	Primary speed ISDN
P/L	Profit and Loss Statement
PA	Provisional Authority
PABX	Private Automatic Branch Exchange
PC	Primary Center
PCO	Public Calling Office
PCS	Personal Communication Service
PDP	Premature Disconnect Probability
PHILCOM	Philippine Global Communications, Inc.
Philicomsat	Philippine Communication Satellite Corporation.
PHP	Personal Handy Phone System
PHS	Personal Handy-Communication System
PILTEL	Pilipino Telephone Corporation
PLDT	Philippine Long Distance Company
PMR	Private Mobile Radio
POCKETBELL	Philippine Wireless, Inc.
PSTN	Public Switched Telephone Network
PT&T	Philippine Telegraph & Telephone Corporation
PVC	Polyvinyl Chloride
RA	Republic Act
RCPI	Radio Communications of the Philippines, Inc.

RE	Reference Equivalents
RLR	Receiving Loudness Rating
RLU	Remote Line Unit
RSU	Remote Switch Unit
RTDP	Regional Telecommunications Development Projects
RTD	Repair, Test and Dispatch
SC	Secondary Center
SCF	Service Control Function
SDH	Synchronous Digital Hierarchy
SEP	Signaling End Point
SIP	Subscriber Investment Plan
SLR	Sending Loudness Rating
SM	Service Management Function
SMART	Smart Information Technologies, Inc.
SPC	Stored Program Control
STM	Synchronous Transport Module
STP	Signaling Transfer Point
TACS	Total Access Communication System
TC	Tertiary Center
TDMA	Time Division Multiple Access
TELOF	Telecommunications Office
TNRI	Teodoro N. Romasanta, Inc.
TTC	Technical Training Center
TTI	Telcommunication Training Institute
UNI	User Network Interface
UPT	Universal Personal Telecommunication
VASP	Virtual Analogue Switching Point
VC	Vertual Container
VPN	Virtual Private Network
VSAT	Very Small Aperture Terminal



## SUMMARY

### **Chapter 1 Introduction**

The Study Team on "the Improvement and Optimization of Telecommunications Networks in the Republic of the Philippines" (hereinafter referred to "the Study Team"), dispatched by Japan International Cooperation Agency (JICA) has carried out the work during the period from June 1993 to March 1994. The study has been carried out in close cooperation with the counterparts of the Department of Transportation and Communications (DOTC).

The report presents the long-term plan (master Plan) performed by the Study Team during the above period.

#### **(1) Objectives of the Study**

The objective of the study is to formulate a Master Plan up to the year 2010, taking into consideration the interconnection of networks among operators for the establishment of an integrated, efficient and reliable network throughout the country and providing new technologies and services therefore. The Study shall cover the whole territory of the Republic of the Philippines. The result of the Study shall be used as a guidance for the implementation by the government and private sector, and as a tool for administrative guidance by the DOTC and NTC.

#### **(2) Scope of the Study**

The Study supplements NTDP (National Telecommunications Development Plan) which was formulated in 1989 and reviewed by the DOTC in 1993. NTDP provides a framework of government policies, objectives and strategies to development of the telecommunications sector up to 2010 such as privatization and competition.

In line with the NTDP's objectives, the Study focuses on network development planning including demand forecast, traffic forecasts and facilities plan.

## **Chapter 2 Socio-economic Conditions**

### **(1) Background**

The Philippines is situated between 21°25' and 4°23' north latitude and between 116° and 127° east longitude. There are about 7,000 islands and they have a total land area of 300,000 square kilometers. There are two pronounced seasons, the rainy season from June to October and the dry season from November to May.

The population of the Philippines is about 60.7 million, 55% of which occupies the largest island, Luzon. English and Filipino which based largely on Tagalog is the official language. Christian Filipinos constitute 93.3% of the Population.

### **(2) Economy**

The share of service sector in GDP is growing, that in 1980 and in 1992 were 36% and 45% respectively. That of agriculture, fishery & forestry figures were 23% and 22%. That of industry were 41% and 33%. The economic growth is negative for the past two years. Major export commodity are coconut product, fruits, mineral product and chemicals textiles. Almost half of the employed persons are absorbed in the agriculture.

### **(3) Official Development Assistance (ODA)**

Over the seven years 1986-1992, US\$ 2 billion in ODA grant/technical assistance and US\$ 11 billion in ODA loans were committed to the Philippines. The communications area received about 3% of total loans.

### **(4) National Development Plan**

#### **(a) Medium-Term Philippine Development Plan (MTPDP)**

The new Medium-Term Philippine Development Plan for 1993-1998 spells out the country's vision and goals for development, as well as the socio-economic development policies and programs. The objective of the government is to make the Philippines an industrialized country by the year 2000.

#### **(b) National Telecommunications Development Plan (NTDP)**

The NTDP for 1991-2010 was issued in October 1990. The 1993 Update of the NTDP was issued in July 1993. Prepared at the initiative of the DOTC, the NTDP seeks to focus ongoing and future efforts in the sector to support both sector development goals and national development objectives.

## **Chapter 3 Telecommunications Sector Outlook**

### **(1) Organizations**

The Philippine government's involvement is primarily through the following agencies:

- (a) The Department of Transportation and Communications (DOTC),
- (b) The National Telecommunications Commission (NTC),
- (c) The Telecommunications Office (TELOF), and
- (d) The Municipal Telephone Project Office (MTPO).

The private sector plays a major role in the communications industry: it has accounted for the bulk of investments to-date and handles most of the country's telecommunications traffic. The Philippine Long Distance Telephone Company (PLDT) is the largest of 47 entities providing telephone services in the Philippines.

### **(2) Development Program**

Main on-going development programs including the planned programs by telecommunication sectors are as follows.

- (a) Government sector
  - (i) National Telephone Program (NTP)
  - (ii) RTDP-C (Regional Telecommunications Development Project Phase C)
  - (iii) Municipal Telephone Program (MTP)
- (b) Private sector
  - (i) X-5 Program, X-5C Program of PLDT
  - (ii) X-6 Program of PLDT

### **(3) Financial Situation**

Investment in the telecommunications sector reached the highest amount, over 75 billion pesos and its 85% was by PLDT. Profit was about 11 billion pesos in total, its 76% was by PLDT and some of local operating companies are losing money. The telecommunications market has grown 26% per year on average.

## **Chapter 4 Present Status of Telecommunication Services**

### **(1) Telephone Services**

Telecommunications in the Philippines is a competitive industry; a number of carriers provide various services. Local exchange service is provided by 42 private telephone operators and 5 government carriers (local governments and TELOF). The largest private operator is PLDT which provides service to approximately 94% of the total telephone sets. There are about 887 thousand telephone subscribers as of 1992. Service areas are about 330 out of 1600 municipalities (20.6%).

Local exchange services have several problems, including the following:

- (a) Large applicant backlog (about 800,000 in nationwide and about 600,000 in Metro Manila)
- (b) Poor quality service
- (c) Isolated local exchanges

The international carriers, PLDT, ETPI, and PHILCOM, have their own gateway facilities.

### **(2) Mobile Telecommunication Services**

There are two analog CMTS providers in the Philippines in 1992. One system is operated by PILTEL. The other system is operated by EXTELCOM, using the U.S. AMPS technology. At the end of 1992, there were 55,920 cellular subscribers in the Philippines.

Six companies have been licensed to provide public radio paging service in the Philippines. Only three (POCKETBELL, EASYCALL, and DIGIPAGE) have services in operation. The remaining three are installing their networks. At the end of 1992, there were 71,758 subscribers.

Other mobile services in operation are Public mobile radio communication services, private mobile radio (PMR) services, maritime mobile services through public coastal stations and aeronautical telephone services for airplanes

### **(3) Record Carrier Service**

The total volume for domestic telegraph in 1990 was 12.5 million messages. PT&T handled 53% of them. There were only 400 domestic telex subscribers in 1990. The traffic was 2 million minutes. PT&T handled 85%. There are other domestic record carriers which are RCPI and TELOF

The total volume for international telegraph in 1990 was about two million words. CAPWIRE handled about 50% of them. There were about 7,000 international telex subscribers in 1990. The traffic was six million minutes. PHILCOM, ETPI, and Globe Telecom each handled 32-33%.

In line with world trends, telegraph and telex traffic is decreasing, as telephone and facsimile traffic increase.

(4) Carrier's carriers

Three carrier's carriers are operating in the Philippines: the Philippine Communications Satellite Corporation (Philcomsat), the Domestic Satellite Philippine Corporation (Domsat), and Oceanic Wireless Network, Inc. These companies lease circuits to other carriers.

(5) Leased Line Service

Their transmission speeds range from 50 bauds to 2 Mb/s and they have bandwidths from 4 kHz to 4 MHz used for private telephone and data networks .

## Chapter 5 Present Status of Telephone Network

(1) Fundamental Network

(a) Network structure

The telephone network hierarchy consist of 4 levels. They are Tertiary Center (TC), Secondary Center (SC), Primary Center (PC) and Local Exchange (LE).

(b) Numbering plan

"0" is used for National Trunk Prefix

"00" is used for International Prefix

The configuration of national significant number is:

Trunk code "0" + Area code + Subscriber Number

(National Significant Number)

(c) Signaling

Decadic Pulse Signaling, MFC-R2 and Common Channel Signaling No. 7 (CCS No. 7) are adopted. 21 toll switching centers and 16 local exchanges in PLDT network are interconnected to the CCS No. 7 network.

(d) Synchronization

PLDT synchronizes its nationwide network by using a three-level master slave hierarchy.

(e) Technical standard

NTC has issued a national standard (NTC MC No. 10-16-90) that specifies service quality and technical standards including of digital network.

(2) Interconnection

30 isolated local exchanges were in July, 1993. Even though EO. (Executive Order) 59, "Mandating Interconnection" and Memorandum Circular No. 9-7-93, "Implementing Guidelines on the Interconnection of Authorized Public Telecommunications Carriers" were promulgated, and the interconnection problems come to another stage. There are still some interconnection problems remaining.

The study team sent questionnaires to the 43 local exchange carriers. Nine responses were received. Reported interconnection problems included:

- (a) insufficient number of interconnection circuits (almost all respondents),
- (b) circuits are sometimes out of order and sometimes no circuits are available,
- (c) noise in the interconnection circuit,
- (d) difficulty in to completing dial connections, especially for incoming calls, due to old PABX equipment, and
- (e) insufficient financing to introduce new exchange facilities.

(3) Traffic

The calling rate in originating, varies from 0.045 to 0.11 for local calls and from 0.0039 to 0.16 for toll calls, and in terminating, it varies from 0.036 to 0.086 in local calls and from 0.0031 to 0.01 in toll calls depending on the region. The NCR and Region VII, which have the major cities Metro Manila and Cebu respectively, are higher than other regions.

## Chapter 6 Present Status of Telephone Facilities

### (1) Switching

PLDT, TELOF, and other local operators provide telecommunication services through networks composed of switching units as follows:

Tertiary Centers (TC)	2
Secondary Centers (SC)	8
Primary Centers (PC)	37
Tandem Exchanges (TDM)	5
Local Exchanges (LE)	282

#### (a) Toll switching

PLDT has 32 toll switching units, providing digital pure toll switching, digital local combined switching, and analog toll switching. The TELOF has five switching units, providing digital local combined switching.

#### (b) Local switching

There are about 1600 municipalities in the Philippines, but only 329 have telephone service. There were a total of 323 switching systems in the whole country, 54 in the NCR and 269 in the provincial area. PLDT provides 858,437 (88%) of the switching capacity in the whole country.

### (2) Transmission

There are two long distance telephone networks in the Philippines. One is operated by the PLDT and the other is owned by the government. The structures of both networks are tree type: which consist of backbone networks connecting among toll switching centers, and the spur links connecting primary centers to local exchanges.

#### (a) PLDT network

PLDT network is divided into three types of networks: a backbone network, local networks, and a NCR junction network. Main routes of backbone network are almost all composed of digital microwave radio transmission systems. Local networks are used 37% digital systems, and NCR junction network consists of 40% optical transmission systems and 60% PCM systems.

(b) Government network

The government network is divided into four areas by project: RTDP, NTP 1-1, NTP 1-2, and NTP 1-3. The government network will connect 23 toll exchanges around the country after completion of NTP 1-1, 1-2, 1-3. Only the RTDP network is operating by DIGITEL (private company). Facilities are mainly used digital microwave radio transmission systems.

(3) Outside Plant

PLDT has been installed approximately 1.31 million pairs of primary cables as of 1992. Approximately 80% of them, about 1.03 million pairs, are in the National Capital Region Area. The average usage rate of the local pairs including the assigned pairs in the PLDT local network is about 60%.

Two types of local cable network systems are used in the Philippines: flexible distribution and rigid distribution system. PLDT has recently (with the X-5 project in 1989) introduced a flexible distribution network system in their network for large cities. The rigid distribution system is used by both the NTP Tranche 1-1 and RTDP Phase B projects because of its economy.

## **Chapter 7 Present Status of Operation and Maintenance**

(1) Operation and Maintenance Systems

The backbone networks in the Philippines are primarily operated and maintained by the PLDT and TELOF. Spur links are operated and maintained by both backbone network operators and local telephone operators.

(2) Maintenance Activities

Operation and maintenance systems of TELOF and PLDT are centralized. Cellular mobile telephone systems, telex, radio paging systems, maritime telephone systems, and shared repeater/trunked network are operated and maintained by the private operating companies.

(3) Training

TELOF has a telecommunication training institute (TTI), and the PLDT also has a technical training center (TTC) in Metro Manila. However, some private companies still do not have a training center. Thus, their training is normally carried out at hotels,



company offices, and foreign manufacturer offices. The TTI trained a total of 1375 trainees, and the TTC trained 4042 trainees in 1992.

(4) Customer Service

Customer service activities including marketing and billing in the Philippines are studied.

**Chapter 8 Forecasted Demand**

(1) Telephone Service Subscription Demand

Macroscopic demand at the national level was forecasted by using the ITU model. The logistic curve and the income elasticity model was used for forecasting demand for the NCR and other regions, respectively. Demand by municipality was estimated by dividing regional demand by the population of each municipality.

A summary of the forecasted demand and the demand density is shown in Table 8-1.

Table 8-1 Summary of Forecasted Demand and Demand Density

Year		1994	1998	2004	2010
Demand:	Total	2,806,445	3,949,791	6,342,905	9,768,909
	NCR	1,377,937	1,983,068	3,014,624	4,082,717
	Regional Area	1,428,508	1,966,723	3,328,281	5,686,193
Density: (demand per 100 inhabitants)	Total	4.22	5.48	7.96	11.08
	NCR	15.84	21.04	28.95	35.44
	Regional Area	2.47	3.14	4.80	7.42

(2) Other Telecommunication Services

The basic methodologies of demand forecast for services are:

- (a) Extrapolation base on the historical data,
- (b) Making a growth curve referring to foreign countries' record.

Table 8-2 summarizes forecasted demand for other telecommunication services.

Table 8-2 Forecasted Demand for Other Telecommunication Services

service	unit	1992	1998	2004	2010		
Target telephone density	per 100 inhabitants	1.4	3.8	6.3	10.0		
Target telephone subscribers	Thousand	887	2,703	5,038	8,768		
Cellular	Thousand	55.9	183.0	557.0	1,520.0		
Radio Paging		71.8	362.1	650.9	1,097.6		
ISDN (N-ISDN)		assumed start year 1998		0.08	155.5	1,572.5	
ISDN (primary speed line)				0.006	13.2	133.7	
Toll Free				2.0	26.1	84.2	
VPN				2.6	33.7	108.7	
CLASS				23.2	302.3	977.0	
Leased Line					6.4	14.8	30.8
Packet Switch					5.5	14.6	14.6

Note: 1992 figures show actual results  
 VPN: Virtual Private Network  
 CLASS: Custom Local Area Signaling Service

## Chapter 9 Guideline of the Plan

This chapter describes the development objectives for the telecommunications sector. The planning period encompassed by the study is from 1993 to 2010. The period of this plan is divided into three phases.

The phases are :

- (1) Phase A : From 1993 - to 1998,
- (2) Phase B : From 1999 - to 2004, and
- (3) Phase C : From 2005 - to 2010.

Targets have been set for the following objectives for each project phase.

### (1) Telephone Supply Target

Telephone main station density is planned to be increased from 1.4 main stations per 100 inhabitants in 1992 to 10 in 2010. As for network coverage, all municipalities have local exchange telephone service at the end of Phase C.

(2) Interconnection Plan of the Network

Executive Order 59, "Mandating Interconnection" and the Memorandum Circular No. 9-7-93 were promulgated in 1993. In the problems, insufficient circuit volume is the biggest which will be studied in this report.

(3) Digitization Plan of the Network

Digitizing the networks, including transmission facilities and switching systems, is a high priority. All analog toll facilities are to be replaced to digital by 1998. According to the replacement plan for local network, the digitization ratio of the local switching systems will reach to 91.6% by the end of Phase A and 100% by the end of Phase B.

(4) Improvement of Telephone Service Quality

The NTC established national service performance standards for telecommunications services. The purpose is to set the quality of service indicators that must be maintained.

(5) Introduction of Non-Telephone and Other New Services

(a) Introduction and supply plan

In addition to basic telecommunications, future society will demand enhanced services based on advanced technology. This section describes the introduction of non-telephone and other new services in the Philippines through 2010. They are; cellular mobile telephone service, radio paging, ISDN, intelligent network service, leased line, and packet switching network service.

(b) Next Generation Mobile Communication Systems

Second-generation mobile communication systems are now being developed. They are expected to meet the rapidly growing demand for mobile communication services through the year 2000 and provide a bridge to future personal communication services(PCS).

The PHP system is being considered for Metro Manila area in the future, because of its large system capacity, which is indispensable for Metro Manila whose population density is strikingly high.

(6) Operation and Maintenance Plan

(a) Network management system

The most suitable surveillance and control system of telecommunication networks is considered and examined.

(b) Centralization of maintenance work

For the purpose of the improvement of the maintenance work, a centralized maintenance center is considered and examined.

(c) Manpower plan

A large number of additional staff personnel will need to be recruited yearly up to 2010. The number of additional staff is computed and examined on the basis of the facility plan up to 2010.

(d) Training plan

Almost all the local telephone operators handle their own staff training. However, they will have trouble training their operation and maintenance staffs by themselves. In this study, suitable training measures are considered.

## **Chapter 10 Traffic Forecast**

This chapter contains the traffic forecast of the target year 1998, 2004, and 2010, in each destination as an integrated network.

(1) Methodology

Due to the difficulty of collecting confidential data such as historical traffic data, Gravity model was used as a method of forecasting future traffic volume in this study. Gravity model is known that traffic volume between two points is calculated by community factor based on distance and total traffic volume of two points.

(2) Traffic Matrix of Target Year

Traffic matrix between PCs and Regions are created by each phase based on the result of the number of estimated subscriber and calling rate for toll and international calls. Traffic matrix between PCs for the year 1998, 2004, and 2010 are attached in Appendix 10-1, 10-2, and 10-3.

## **Chapter 11 Telecommunication Network Plan**

This master plan was prepared as a guideline to understand the perspective and targets of future telecommunications and to put forth a development principle for telecommunications toward the 21st century: thoroughly forecasting the size of a single network and the investment enough to meet the supply targets through the year 2010.

(1) Network Structure

4 network patterns were selected for evaluation based on the forecasted traffic matrix in 2010, and the three level hierarchical network, with two secondary centers in Metro Manila and Cebu, and a primary center in each province, is the most economical structure. Transmission cost in long distance network has become cheaper and not affected by distance so much as before. In network optimization, the efficiency of operation and maintenance and network stability have become important factors.

(2) Routing

Alternative routing and far to near rotation systems are adopted for toll network routing scheme.

(3) Switching Plan

The requested switching capacity of telecommunication facility depends on the demand and traffic forecast, supply plan and sizes of the building. Toll switching centers are primarily located in provincial capitals. The proposed local switching system has one exchange in each municipality. The capacity of these local switching systems defined the switching type, which are LS (Local Switching System), RSU (Remote Switching Unit), and RLU (Remote Line Unit).

(4) Numbering Plan

They are 0ABC, 1XY and \*XY and #XY types of numbers. The numbering plan was planned logically for long time considering numbering capacity, telephone demands and new services.

(5) Signaling Plan

CCS No. 7 signaling system has applied with Non Associated Mode.

(6) Synchronization Plan

PLDT has already established synchronization network plan that a primary clock is installed at Metro Manila. For the case of a disaster, it was planned that another primary clock should be installed in Cebu supposing wide area disaster.

(7) Interconnection Plan

There are still remaining problems. Here is showing concrete measures in maintaining service grade, number of interconnection circuits, introducing metering system.

(8) Technical Standard

MC No. 10-16-90 listed all digital telecommunications standards which are based on ITU Recommendations. There are few more things that need to be described for new technologies and services for ISDN which are under studying in ITU.

The study team recommends establishing telecommunications technology standards organization to study standards in telecommunication field in the Philippines.

(9) Transmission Network Plan

It was studied as an integrated single network using existing transmission systems, using ladder type and loop type network with fiber optic systems with SDH for higher density routes. For provincial transmission networks, loop type in PC-LE networks, and for LS-RSU or RLU, star type networks are applied based on an application standards specified for it.

## Chapter 12 Telecommunications Facilities Plan

(1) Switching Facilities

The number of additional municipalities served in Phase A is 450, in Phase B is 479, and in Phase C is 399.

(a) Expansion Plan

(i) Local Switching Facilities

Local switching line capacity grows by 2,077,000 lines in Phase A, 2,550,100 lines in Phase B, and 4,116,000 lines in Phase C.

(ii) Toll switching facilities

Toll switching trunk capacity grows by 26,986 trunks in Phase A, 33,016 trunks in Phase B, and 66,774 trunks in Phase C.

(b) Replacement plan

Manual and SXS switching facilities are replaced during Phase A and XB and SPC-analog facilities are replaced during Phase B.

(c) Digitization

As analog switching systems are replaced by digital ones during Phase A and B, the percentage of digitized system will rise from 32.8% to 91.6% at the end of Phase A and to 100% at the end of Phase B.

(2) Transmission Facilities

In this study, required number of 2-Mb/s paths is estimated by using the result of the circuit accommodation plan, and also cost is estimated based on 2M b/s paths.

(3) Outside Plant

The number of primary cable pairs to be installed are listed in Table 12-1.

Table 12-1 Number of Primary Cable Pairs to be installed during each phase

No. of Pairs	Phase A			Phase B			Phase C		
	Large Area	Small Area	Total	Large Area	Small Area	Total	Large Area	Small Area	Total
Total	2,231,392	440,792	2,672,184	2,819,403	616,367	3,435,769	4,731,304	756,035	5,487,339
NCR	1,742,370	0	1,742,370	1,809,656	0	1,809,656	1,571,623	0	1,571,623
Region Total	489,022	440,792	929,814	1,009,747	616,367	1,626,114	3,159,681	756,035	3,915,716

(4) Non-Voice Services and New Services

On the basis of the introduction plan in section 9.5, the facility plans of non-voice services and new services are listed in Table 12-2.

Table 12-2 Facility Plan of Non-Voice Services and New Services

Service	Unit	1998	2004	2010	Total
Cellular	1000 sub.s	164.7	336.6	922.6	1,423.9
Radio Paging	1000 sub.s	325.9	259.9	473.8	1,059.6
N-ISDN	1000 sub.s	0.05	120.5	1,020.3	1,140.8
P-ISDN	1000 sub.s	0.004	10.2	86.7	96.9
Intelligent Network	NSSP	1			1
	NSP	1	1	1	3
Leased Line	1000 lines	5.0	9.8	21.1	35.9
Packet Switch	1000 Sub.s	4.1	8.1	0	12.2

Note: - Including replacement in Cellular and Radio Paging column  
 - ISDN and Intelligent Network services are assumed started in the year 1998.  
 - N-ISDN: Narrow Band ISDN of basic speed: 64 Kb/s  
 - P-ISDN :Primary speed ISDN: 2.048 Mb/s  
 - NSSP: Network Service Support Point  
 - NSP : Network Service Control Point

## **Chapter 13 Operation and Maintenance Plan**

### **(1) Network Management Systems**

(a) The existing backbone network for the PSTNs is primarily composed of two networks, each operated by the PLDT and TELOF. They are interconnected with each other. Thus, it is necessary to strengthen the communication of operating information between operators in order to reduce network downtime. We therefore recommended establishing an information hot line and establishing an operator support system.

(b) A large number of local switches are expected to be installed nationwide between now and 2010. It is necessary to strengthen the communication of operating information between operators in order to reduce local network downtime. It is also necessary to reduce the maintenance work volume of local telephone companies. We therefore recommended establishing an information hot line and unifying several franchised areas under one primary center.

### **(2) Subscriber Facilities Maintenance**

The network expansion project will expand the telephone service area to all municipalities; the number of telephone subscribers will grow rapidly (to around 8,767 thousand). In order to improve the maintenance of subscriber facilities, we recommended that the concept of centralized maintenance center of subscriber facilities be implemented.

### **(3) Staffing Plan**

We calculated the number of additional support personnel based on the expected growth in the number of main lines with the correlation curve. A total of 48,003 additional support personnel will be required to operate and maintain the additional 7,880 thousand main lines expected to be installed through the year 2010.

### **(4) Training Plan**

The following measures are recommended for promoting smooth operation and maintenance.

(a) Promote on-the-job training.

(b) Expand the training capacities of the TTI and TTC.



- (c) Enhance the project-associated training in the manufacturer's factories and in the Philippines.
- (d) Also train local telephone company staff at the TTI and TTC.
- (e) Promote regional training program taught by instructors dispatched from the TTI and TTC.
- (f) Conduct four types of training (leader training, engineer training, technician training, and new staff training).
- (g) Establish a training center at each company.

#### **Chapter 14 Project Evaluation**

- (1) Present tariff structure, financial statements and operating results of major telecommunications carrier are used for the financial projection.
- (2) The FIRR(financial internal rate of return) for the master plan is calculated as 11.67%. The FIRR for the master plan of NCR part and province part are 12.82% and 10.39% respectively.
- (3) The sensitivity analysis sets assumptions on the fluctuation ranges of decrease of domestic toll call revenue, international toll call revenue and the increase of investment amount. The increase of investment amount has the biggest influence on the FIRR and decrease of domestic toll call revenue has the smallest influence on the FIRR.
- (4) Based on the data of the present tariff and traffic, the demand function derived from the multiple regression is used in order to calculate the consumers' surplus. The economic benefit is estimated as 189% of financial benefit. Using the economic benefit instead of the financial benefit, the economic internal rate of return is calculated as 49%.

#### **Chapter 15 Implementation Plan**

- (1) Relation to master plan

The project packages proposed in this chapter are in line with the study on the improvement and optimization of telecommunications network and NTDP, to increase telephone density to at least 3.8 nationwide by 1998 (Phase A). This projects which cover the rural areas, have to be implemented by private sectors, but it needs the government leadership considering the governmental finance including ODA, because of low profitable areas.

Personal Handy Phone system (PHP) is assumed to introduce in Makati district as a model case as one of the project packages.

(2) Selection of Project Sites

Projects are formed on Region by Region basis. Projects are to provide telephone lines in primarily unserved or inadequately served areas.

Expansion of PLDT, RTDP, and NTP 1-1 toll backbone network is not included in this packages.

(3) Project Packages

The projects establish fully digital telephone systems, digital microwave / fiber optical cable links, outside plant, and interconnection toll facilities to provide 286,200 telephone switching lines to 224 cities and municipalities. Then number of local exchange sites and the switching capacity are shown in Table 15-1. Cost estimation and financial evaluation was done by region by region basis.

Table 15-1 Number of Sites and Switching Capacities

Project Name	Number of Sites	Switching Capacity
Region 2	18	7,000
Region 3	6	5,000
Region 4	25	37,300
Region 5	28	11,800
Region 6	26	31,600
Region 7	32	41,400
Region 8	19	9,300
Region 9	17	15,500
Region 10	13	41,100
Region 11	25	69,800
Region 12	15	16,400
Total	224	286,200

(4) Other Project

PHP system with 10,000 terminals in Makati district is studied as a model case. Cost estimation is shown in Table 15-2.

Table 15-2 Cost Estimation

	(Unit: US\$ 1000)
Switching equipment(1,430 channel)	715
Adapter and CPU(including work station and software)	210
Base station (11 ch 130 station)	1,950
Installation(including entrance cable)	1,170
Terminals	5,000
<b>Total</b>	<b>9,045</b>

## Chapter 16 Recommendations

This master plan was prepared as a guideline to understand the perspective and targets of future telecommunications and to put forth a development principle for telecommunications toward the 21st century: thoroughly forecasting the size of a single network and the investment enough to meet the supply targets through the year 2010, and analyzing the expected financial situation.

Based on the results of this study, the recommendations described in this chapter for implementing this master plan by the relevant organizations focus on the technical and economic aspects needed to improve and optimize the telecommunication network in the Philippines.

- (1) Higher priority to telecommunications in the development of the country
- (2) Adequate scale of network for each local operating company
- (3) Interconnection
  - (a) Grade of service (GOS)
  - (b) Introduction of metering system at interconnection circuits
  - (c) Coordination of interconnection circuit construction,
- (4) Study on new mobile telecommunication system,
- (5) Management of information and statistics on telecommunications,
- (6) Technical standard,
  - (a) Establishment of telecommunications technology standards organization
  - (b) Adoption of LR as criteria of speech quality,
- (7) Fostering local manufacturing,
- (8) Financial strategies,
- (9) Strengthening of training, and
- (10) Project package implementation.

# CHAPTER 1

## INTRODUCTION

## **CHAPTER 1 INTRODUCTION**

The Report of the study on the Improvement and Optimization of Telecommunications Networks in the Republic of the Philippines has been prepared, which is composed of the following:

- (1) Summary
- (2) Main Report
- (3) Appendix

The Study Team on "the Improvement and Optimization Plan of Telecommunications Networks in the Republic of the Philippines" (hereinafter referred to "the Study Team"), dispatched by Japan International Cooperation Agency (JICA) has carried out the work during the period from June 1993 to March 1994. The study has been carried out in close cooperation with the counterparts of the Department of Transportation and Communications (DOTC).

This report presents the long-term plan (Master Plan) performed by the Study Team during the above period.

### **1.1 Background of the Study**

In the Philippines, many telecommunications operators are providing the diversified telecommunications services with their own local networks in each franchised area. The problem/trouble on interconnections and time difference of facilities renovation among operators often result in the deterioration of qualities of the telecommunication network in the Philippines. The interconnection among operators is essential to provide good and economical telecommunications services throughout the country.

From the view point of the future development of telecommunications in the Philippines, many kinds of telecommunications system with new technologies such as the terrestrial digital microwave, optical fiber, satellite, mobile and submarine cable system, etc. should be introduced to establish the more economical, efficient and flexible network.

New telecommunications operators will get the franchise and are going to provide advanced telecommunications services. The service demand of ISDN is being appeared in the large cities Manila and Cebu.

Henceforce, the need for study how to establish the integrated, efficient, economical and

reliable nationwide telecommunications network which provides the new technologies and services in the Philippines is seen.

## **1.2 Objectives of the Study**

The objective of the study is to formulate a Master Plan up to the year 2010, taking into consideration the interconnection of networks among operators for the establishment of an integrated, efficient and reliable network throughout the country and providing new technologies and services therefore. The Study shall cover the whole territory of the Republic of the Philippines. The result of the Study shall be used as a guidance for the implementation by the government and private sector, and as a tool for administrative guidance by the DOTC and NTC.

## **1.3 Scope of the Study**

The Study supplements NTDP (National Telecommunications Development Plan) which was formulated in 1989 and revised by the DOTC in July 1993. NTDP provides a framework of government policies, objectives and strategies to development of the telecommunications sector up to 2010 such as privatization and competition.

In line with the NTDP's objectives, the Study focuses on network development planning including demand forecast, traffic forecasts and facilities plan.

The Study should be executed as follows:

- (1) Collection and review of data/information
- (2) Field survey
- (3) Forecast
  - Demand and traffic forecasts
  - Trend of new technologies and new services
- (4) Formulation of Master Plan
  - Basic policy on the improvement and expansion of telecommunications networks
  - Telecommunications network plan
  - Facilities plan
  - Operation and maintenance plan
  - Cost estimation
  - Project evaluation
  - Implementation plan

## 1.4 Organization of the Study

### 1.4.1 Japanese Advisory Committee

The Japanese Advisory Committee provides the study team with advice and supervision for implementing the Study. The member of the committee are as follows:

Name	Duty in Charge	Affiliated to
Mr. Kaoru SUZUKI	Chairman (Transmission Systems)	Senior Advisor, International Cooperation Division, International affairs Department, Minister's Secretariat, Ministry of Posts and Telecommunications
Mr. Tomoo TAKESHITA*1	Member (Switching Systems)	Technology Policy Division Communications Policy Bureau Ministry of Posts and Telecommunications
Mr. Mutsuharu NAKAJIMA*2	Member (Switching Systems)	Technology Policy Division Communications Policy Bureau Ministry of Posts and Telecommunications
Mr. Takao YAMAZAKI	Member (Network Planning)	Telecommunication Development Specialist Institute for International Cooperation Japan International Cooperation Agency (JICA)

Note: \*1 up to August 1993

\*2 from August 1993

#### 1.4.2 Study Team

The names and duties in charge of the Study Team members are shown in the following list:

Name	Duty in Charge
Mr. Shiro TAMURA	Team Leader/Network Planning
Mr. Wataru KURASHIMA	Assistant Team Leader / Network Planning, Operation and Maintenance
Mr. Tetsu MAESHIBA	Demand Forecasts / Outside Plant
Mr. Yoshio WADA	Traffic Forecasts
Mr. Tomiatsu TSUJIMURA	Switching System
Mr. Tsutomu SHIROMA	Transmission System
Mr. Soichi SAKATA	New Services
Mr. Hisahiro HAMAHATA	Financial and Economic Analysis

#### 1.4.3 Counterpart Team

In order to achieve both technical transfer and an effective study, DOTC assigned its counterparts in the planning section of the DOTC. The names, duties in charge are shown in the following list.

Name	Duty in Charge
Mr. Manuel L. IMPERIAL	Team Leader / Network Planning
Mr. Jose S. TANQUECO, Jr	Network Planning / Operation & Maintenance
Mr. Raul SANIEL	Demand Forecasts / Outside Plant
Mr. Philip VARILLA	Traffic Forecasts
Ms. Theresa CORPUZ	Switching System
Mr. Patricio V. BUTAY	Transmission System
Ms. Luxmi DE LEON	New Services
Ms. Cristina CONCEPCION	Financial & Economic Analysis



## 1.5 Schedule of the Study

The study is divided into seven phases as shown in Table 1.5-1. Figure 1.5-1 illustrates the work schedule and the main items of the Study.

Table 1.5-1 Study Process

Study Phase	Main Study Items	Period
First Work in the Philippines	Explanation and discussion of Inception Report, Data collection, Field survey, Demand forecast, Explanation and discussion of Progress Report,	Jun. - Aug. 1993
First Work in Japan	Demand forecast, Guideline of master plan, Traffic forecast, Telecommunications network plan, Facility plan, Preparation of the Interim Report	Aug. - Oct. 1993
Second Work in the Philippines	Explanation & discussion of the Interim Report, Data collection & Field survey(Supplementary)	Oct. -Nov. 1993
Second Work in Japan	Facilities plan, Operation and maintenance plan, Project evaluations, Implementation plan, Recommendations, Preparation of the Draft Final Report	Nov. 1993 - Jan. 1994
Third Work in the Philippines	Explanation and discussion of the Draft Final Report	Jan. 1994
Third Work in Japan	Preparation and submission of Final Report	Feb. -Mar. 1994

Figure 1.5-1 Work Schedule

Work Item		1993												1994		
		6	7	8	9	10	11	12	1	2	3					
First Work in the Philippines	(1) Explanation and Discussion of the Inception Report	IC/R ▲														
	(2) Data Collection, Analysis & Field Survey		■													
	(3) Review of the Demand Forecasts		■													
	(4) Explanation of the Progress Report			▲ P/R												
First Work in Japan	(5) Demand Forecasts			■												
	(6) Guideline of the Master Plan			■												
	(7) Basic Policy of the Project Evaluations			■												
	(8) Traffic Forecasts			■												
	(9) Telecommunications Network Plan			■												
	(10) Facilities Plan (Draft)			■												
	(11) Preparation of the Interim Report					■										
Second Work in the Philippines	(12) Explanation & Discussion of the Interim Report								▲ IT/R							
	(13) Data Collection & Field Survey (Supplementary)								■							
	(14) Facilities Plan									■						
Second Work in Japan	(15) Operation and Maintenance Plan									■						
	(16) Project Evaluations									■						
	(17) Implementation Plan									■						
	(18) Recommendations									■						
Third Work in the Philippines	(19) Preparation of the Draft Final Report									■						
	(20) Explanation and Discussion of the Draft Final Report									■						
	(21) Final Report												▲ DF/R			▲ F/R

IC/R : Inception Report P/R : Progress Report IT/R : Interim Report  
 DF/R : Draft Final Report F/R : Final Report

■ Work in the Philippines  
 ■ Work in Japan  
 ▲ Explanation and Discussion in the Philippines

## **CHAPTER 2**

### **SOCIO-ECONOMIC CONDITIONS**



## **CHAPTER 2 SOCIO-ECONOMIC CONDITIONS**

### **2.1 Background**

#### **2.1.1 Geography**

##### **(1) Location**

The Philippine archipelago is situated between 21<sup>o</sup>25' and 4<sup>o</sup>23' north latitude and between 116<sup>o</sup> and 127<sup>o</sup> east longitude.

The archipelago lies about 2,000 kilometers east of Vietnam some 15 degrees north of the equator. It stretches 3,000 kilometers north to south and 1,700 kilometers east to west at its widest point. To the north lies Taiwan and to the south is Borneo. It is bounded on the east by the Pacific Ocean and on the west by the South China Sea.

##### **(2) Land**

There are 7,107 islands, of which only 3,000 are named. They have a total land area of 300,000 square kilometers: one of the largest island groups in the world.

##### **(3) Climate**

The climate is generally pleasant. Average temperature is 32<sup>o</sup>C. Humidity ranges from 75-80%. There are two pronounced seasons, the rainy season from June to October and the dry season from November to May. Rainfall averages 235-240 centimeters a year. The warmest months are April and May, and the coolest are December through February.

#### **2.1.2 Demographics**

##### **(1) Population Size**

The population of the Philippines is about 60.7 million, 55% of which occupies the largest islands, Luzon, and it is the 13th most populous nation in the world. With an annual average growth rate of 2.3%, the Philippines has one of the fastest growing populations (about 1.3 million people added each year). As of 1990, the

population density was 202 persons per square kilometer; there were 12,498 persons per square kilometer in the National Capital Region, making Manila one of the most crowded cities in the world.

(2) Language

There are 87 native dialects; Filipino, based largely on Tagalog, is the national language. English and Filipino are the official languages. English, the primary language of instruction in schools, is widely used.

(3) Religion

The Philippines is the only Christian nation in Asia. Christian Filipinos constitute 93.3 % of the population. Moslems make up the majority of the remaining 6.7%.

## **2.2 Economy**

### **2.2.1 Outlook**

Through the 1950s and 1960s, the Philippine government developed the industry covering the shortage of imported materials by limitation of imports and high quota on imports. In the 1970s the government changed its policy and began to encourage export and invite foreign investments.

Now the government has pursued and expanded the scope of economic reforms. The reforms have been designed to orient the economy towards greater participation and competition in international markets, and have included the liberalization of foreign exchange and measures to attract foreign direct investment.

### **2.2.2 Economic Structure**

The share of service sector in GDP is growing, that in 1980 and in 1992 were 36% and 45% respectively. That of agriculture, fishery & forestry figures were 23% and 22%. That of industry were 41% and 33%. The economic growth is negative for the past two years. Major export commodity are coconut product, fruits, mineral product and chemicals textiles. Almost half of the employed persons are absorbed in the agriculture.

Table 2.2-1 shows the key economic indicators of the Philippines for the past five years (1988 - 1992).

Table 2.2-1 Key Economic Indicators of the Philippines

		1988-1992				
		1988	1989	1990	1991	1992
GDP Total *1	peso million	799,182	925,444	1,073,098	1,244,741	1,338,421
-Agriculture	peso million	183,515	210,009	235,956	261,348	290,338
-Industry Sector	peso million	280,957	322,964	371,347	424,504	446,334
-Service Sector	peso million	334,710	392,471	465,795	558,889	601,749
-Real GDP Growth	%	6.75%	6.21%	2.66%	(0.80%)	(0.27%)
Income & Price						
-Consumer Price Index	1988=100	100	112	128	152	166
-Inflation Rate	%	-	12.2	14.2	18.7	8.9
Balance of Payment						
-Exports	\$ million	7,074	7,821	8,186	8,840	9,824
-Imports	\$ million	8,159	10,418	12,206	12,051	14,519
-Current Account	\$ million	(390)	(1,465)	(2,688)	(1,033)	(999)
-Foreign Investments	\$ million	986	854	469	654	737
-Overall BOP Position	\$ million	650	451	(183)	1,405	445
-Exchange Rate	peso : \$	21.065	21.703	24.200	27.516	25.310
Employment *2						
-Total Employed Person	thousand	21,356	21,889	21,900	22,586	23,898
-Agriculture *3	thousand	9,891	9,896	9,750	10,219	10,867
-Industry Sector	thousand	3,358	3,493	3,491	3,628	3,820
-Service Sector	thousand	8,105	8,483	8,643	8,728	9,189
-Other Industry	thousand	1	16	16	10	23
-Overseas Workers	thousand	478	523	599	702	724
National Gov't Revenues	peso million	112,861	142,136	180,900	340,731	409,804

Note \*1 : The number is as of July of each year.

\*2 : The figures of employed persons are as of July of each year,  
total number of employed persons does not include overseas workers.

\*3 : Agriculture includes fishery and forestry.

Source : 1993 Philippine Statistical Yearbook (NSCB)

## **2.3 Official Development Assistance (ODA)**

### **2.3.1 Background**

Development of a nationwide infrastructure requires considerable funds. To facilitate and sustain development and economic growth, adequate official support is necessary. The Philippines has long relied on substantial external assistance in the form of ODA to supplement and complement available domestic resources to finance the country's development, as well as to increase the efficiency of investments supporting of self-sustained growth. Priority has been given to grants and concessional financing that enable the government to implement more socially desirable projects and cushion the debt service impact of commercial sources of external funds.

The government encourages the private sector to participate in and undertake developmental and priority projects of government. This policy recognizes the private sector's capability to manage resources efficiently; to innovate, adapt, and apply appropriate technology; and to bring in additional resources to augment public funds used for financing public investment programs. In recognition of the important role which the private sector plays as a partners of government process, the private sector will be allowed to use ODA and other official flow (OOF) for priority development projects of the public sector. This policy of encouraging the private sector was stated in the NEDA Board Resolution No. 38, Series of 1991, "Guidelines on the Private Sector Access to Official Development Assistance and Other Official Flows".

### **2.3.2 Type of ODA**

ODA is provided either through multilateral institutions or through bilateral programs. Multilateral institutions include the United Nations (UN), the World Bank (WB) and regional development banks such as the Asian Development Bank (ADB). While multilateral institutions are either owned or controlled by member governments and do not possess any national identity, bilateral programs are accredited to a specific donor country or government (e.g., Japan, US, Germany, etc.). These bilateral programs usually have specific objectives, such as maintaining and expanding trade relations; maintaining and expanding investment opportunities; and supporting access by to multilateral agencies.



ODA takes the form of either a concessional (soft) loan or a grant. For the former, the interest rate may range from four to seven percent (for multilateral sources) and from zero to five percent (for bilateral sources). Soft loans have maturity periods ranging from 10 to 50 years and grace periods of five to ten years. Concessional loans expectedly have better terms than commercial loans.

ODA to the Philippines is extended by multilateral and bilateral institutions for purposes of financial cooperation (or capital assistance) and technical cooperation (or technical assistance). ODA terms and conditions of loans by funding source as of 30 April, 1992 is shown in Appendix 2-1.

### **2.3.3 Eligible Entities in Private Sector**

It is the government's general policy to encourage the private sector (i.e., duly registered profit-oriented establishments) to participate in and to undertake development of priority projects in the public sector. The private sector will thus be allowed access to ODA in recognition of its important role as partners of government in the development process. Guidelines on private sector access to ODA was approved by NEDA Board on October 9, 1991. The guidelines define, among others, the mode of access, conditions for access and concessionality, and the institutional arrangements involved.

### **2.3.4 ODA Programming**

To be effective in channeling and directing the use of available foreign resources for priority programs and projects of the government and to play a proactive role in drawing up the pipeline of projects for a particular funding source at any given time. ODA programming seeks to maximize the beneficial impact of ODA on sectoral and regional development by matching the needs of priority programs and projects with resources that can be made available through foreign aid. The aim is to enable the target beneficiaries to obtain the required goods and services available through ODA in the appropriate form, quality and cost.

The government, through the NEDA Board and its Secretariat, currently serves as the overall coordinator and programmer of ODA flows, either in the form of concessional loans or grants, for both the national and local development project of the country.

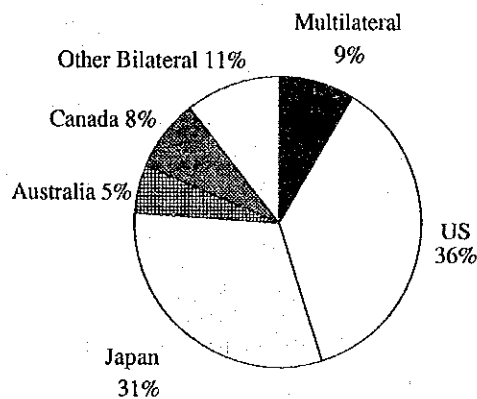
### 2.3.5 Results of ODA

Over the seven years 1986-1992, US\$ 2 billion in ODA grant/technical assistance and US\$ 11 billion in ODA loans were committed to the Philippines.

The two major sources of the grant/technical assistance were the United States and Japan; together they provided 67% of the total. The three major source of ODA loan sources were the WB, Japan and the ADB; together they provided more than 94 % of the total loans. Figure 2.3-1 shows ODA Grant/TA committed by source 1986-1992 and Figure 2.3-2 shows ODA loans committed by source 1986-1992.

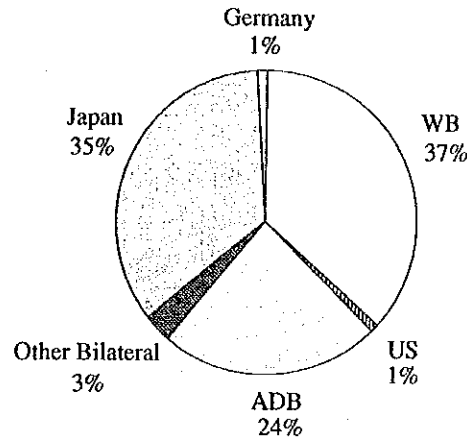
"Commodity aid", "social service and agriculture" and "social infrastructure" were the three areas receiving the most grant ODA. "Energy", "power & electrification" and "transportation and water resources" were the three areas receiving the most loan ODA. The communications area received about 3% of total loans. (See Appendix 2-2: ODA Grant/Technical Assistance by Source, Appendix 2-3: ODA Loans Committed by Source, Appendix 2-4: ODA Grants Committed by Sector and Appendix 2-5: ODA Loans Committed by Sector.)

Figure 2.3-1 ODA Grants/TA Committed by Source (1986-1992)



Source: NEDA

Figure 2.3-2 ODA Loans Committed by Source (1986-1992)



Source: NEDA

## 2.4 National Development Plan

### 2.4.1 Medium-Term Philippine Development Plan (MTPDP)

The government-issued Medium-Term Philippine Development Plan for 1987-1992 recognized the importance of telecommunications in the economic development process and presented development targets for the telecommunication sector. In line with the plan's expressed objectives of increasing general income levels, spreading development benefits more equitably, and dispersing industrial development to the less developed regions, the sector targets included more extensive communications network coverage, higher telephone density, and the adoption, where appropriate, of new communications technologies.

The Medium-Term Philippine Development Plan for 1993-1998 spells out the country's vision and goals for development, as well as the socio-economic development policies and programs that will be carried out during the Ramos administration. It was prepared by both the government and the private sector, including the Congress, local government units, the academe, and non-government organizations. President Ramos clarified this vision of development when he launched "Philippine 2000". While Philippine 2000 capsules the President's and the people's vision of development by the year 2000, the Philippine Development Plan provides the guideposts: the development "road map" to attain the vision.

The objective of the government is to make the Philippines an industrialized country by the year 2000. To reach this goal, the telecommunication sector will need to pursue more vigorous development through intensified private sector participation. The high level of attention given to the telecommunication sector reflects the government's recognition that an inadequate telecommunication infrastructure impedes economic growth, and that the Philippines has fallen behind nearly all other Southern Asian countries in terms of telecommunication development. Thus the government, with major participation by the private sector, aims to expand basic telecommunication service throughout the country, as well as to improve service in those areas already being served.

#### **2.4.2 Telecommunication Sector Targets**

The Medium-Term Philippine Development Plan presented development targets for the telecommunication sector, including more extensive network coverage, higher telephone density, and the adoption of new telecommunication technologies.

The targets set by the plan are as follows:

(1) **Goals and Objectives**

- (a) Meet the growing demand for telephone services by increasing available telephone lines;
- (b) Interconnect all local telephone exchanges into the main backbone to enable complete subscriber linking; and
- (c) Improve the quality of telecommunication services to the level set by the National Telecommunications Commission (NTC).

(2) **Policy and Strategies**

- (a) Privatize all government telecommunication assets as soon as possible;
- (b) Provide for more open entry of private firms to promote greater competition and efficiency in telecommunication services;
- (c) Provide operational assistance and financial incentives to private operators in the implementation of projects consistent with government objectives;
- (d) Adopt clear and simpler rules for the interconnection of public networks and encourage equitable toll revenue sharing schemes to ensure financial viability of local exchanges; and
- (e) Explore the development and expanded use of satellite and related technology.

(3) Key Measurable Targets

- (a) Install about 1.32 million additional telephone lines to increase the telephone density from about 1.4 to 4.0 lines per 100 people by the end of 1998;
- (b) Extend existing Public Calling Office (PCO) services to all municipalities;
- (c) Interconnect all local telephone exchanges to the main backbone; and
- (d) Establish/improve the telecommunications facilities for weather forecasting, maritime communications, and government communications.

### **2.4.3 National Telecommunications Development Plan**

The first Philippine National Telecommunications Development Plan was issued in 1982 to guide the development of the country's telecommunications sector from 1982 to 1987. A major feature of the Plan was major government investment in the communications sector, primarily through the National Telephone Program (NTP) which envisioned the installation of some two million new telephone lines.

In February 1986, the country's national leadership changed for the first time in more than two decades. In 1987, the government issued the Medium-Term Philippine Development Plan for 1987-1992, which also recognized the importance of the communications sector. Also in 1987, the DOTC issued policy statements intended to rationalize and guide the development of Philippine telecommunications through the 1990s. In late 1989, the DOTC started work on an updated National Telecommunications Development Plan (NTDP) covering the period 1991 to 2010. This plan was issued in October 1990.

Following the issuance of the 1990 NTDP, significant progress was made on several fronts, including:

- (1) Issuance by the National Telecommunications Commission in 1990 of technical standards governing the sector;
- (2) Issuance by the DOTC of a department circular (entitled "Implementation Guidelines for the Rationalization of Local Exchange Telecommunication Services") in September 1991;
- (3) Issuance by the DOTC of a department circular (entitled "Cellular Mobile Telephone System Policy") in November 1992;

- (4) An increase in the nationwide telephone density from 1.0 main lines per 100 inhabitants in 1990 to 1.4 as of year-end 1992;
- (5) Establishment of PCOs in 560 municipalities under the Municipal Telephone Act as of September 1993;
- (6) Interconnection of local exchange carriers, and the issuance by the Office of the President in February 1993 of Executive Order No. 59 (EO 59), which mandated the interconnection of still-isolated public telecommunications networks; and
- (7) Issuance by the office of president in July 1993 Executive Order NO. 109 (EO 109), which improve the provision of local exchange carrier service.

The 1993 update of the NTDP took account of these developments. Prepared at the initiative of the DOTC, the NTDP seeks to focus ongoing and future efforts in the sector to support both sector development goals and national development objectives. The NTDP therefore proceeds from and expands on the relevant sections of the MTPDP.

The NTDP is intended to be the primary means of communicating the following information to interested parties:

- (1) The desired development direction and minimum targets for the telecommunications sector during the plan period; and
- (2) The general means proposed to deal with sector constraints and to achieve development targets.

The sector development targets incorporated in the NTDP are based on the broad development policy. Chapter II (SECTOR POLICIES) of the NTDP gives more details on the government's policy framework for telecommunications.

The NTDP also contains the following;

- (1) A review of the status of telecommunications in the Philippines at the start of the plan period;
- (2) Development targets and resource requirements;
- (3) Implementation strategies; and
- (4) Financial and economic assessments required to meet the development targets.

## **CHAPTER 3**

# **TELECOMMUNICATIONS SECTOR OUTLOOK**





## CHAPTER 3 TELECOMMUNICATIONS SECTOR OUTLOOK

### 3.1 Organizations

The entities involved in the Philippine telecommunications sector include relevant government agencies, private and public telecommunications network operators, equipment manufacturers and suppliers, users of telecommunications services, and local industry associations.

The structure of the Philippine telecommunications sector is illustrated in Figure 3.1-1.

#### 3.1.1 Government Agencies

The Philippine government's involvement is primarily through the following agencies:

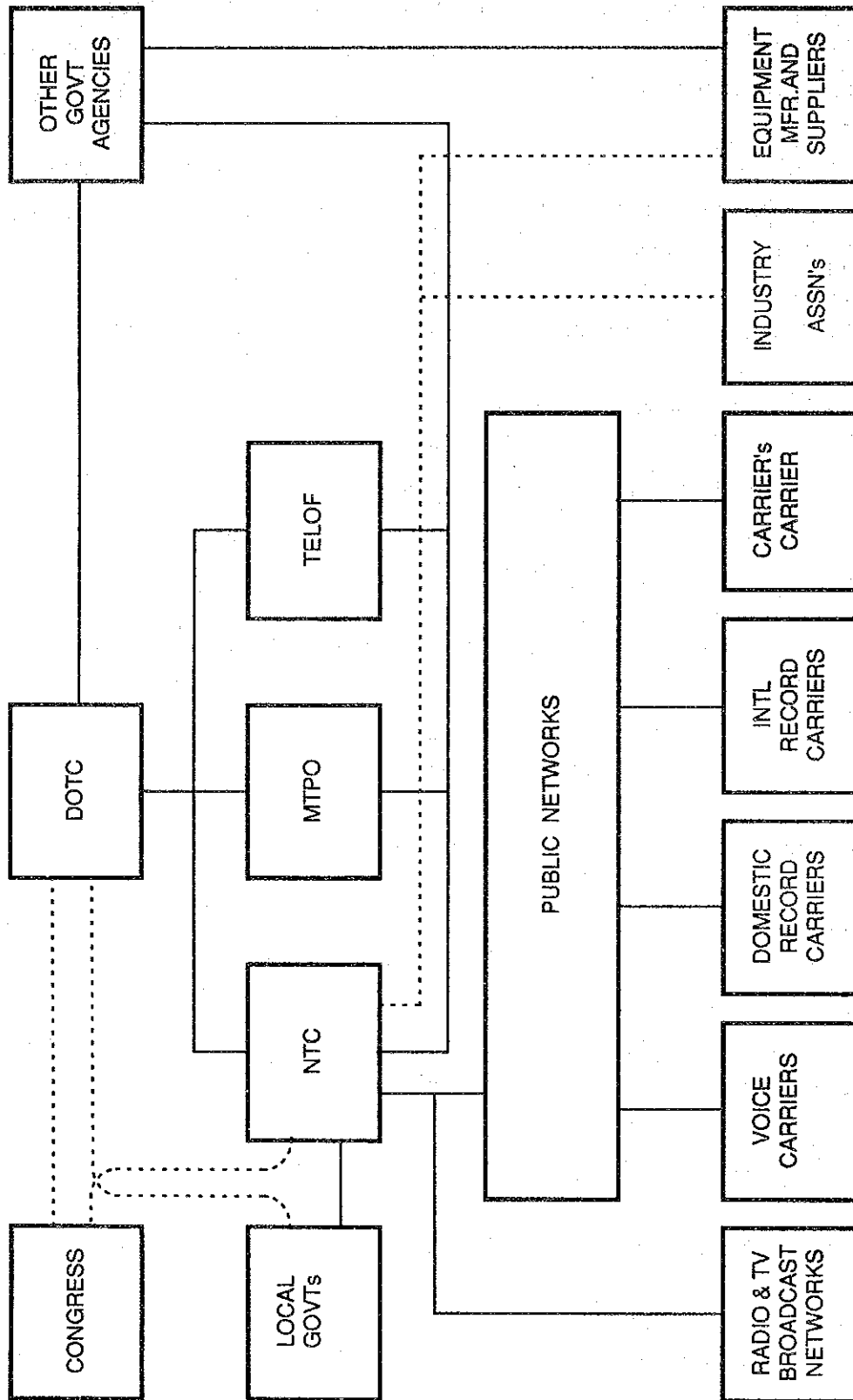
- The Department of Transportation and Communications (DOTC) is the policy-making body for telecommunications,
- The National Telecommunications Commission (NTC) as the regulatory arm, with quasi-judicial powers,
- The Telecommunications Office (TELOF) is the operating arm, providing limited telephone and telegraph services in rural areas, and
- The Municipal Telephone Project Office (MTPO) is the implementing arm for the Government's municipal telephone program.

The National Economic and Development Authority (NEDA) formulates the country's overall economic policies and development strategies. DOTC policies are prepared within this general framework. The Department of Trade and Industry (DTI) and the Board of Investments (BOI), an agency of the DTI, formulate policies regarding investments. They identify preferred areas of investment which may qualify for incentives. Both congress and local (provincial or city) government agencies are empowered to enfranchise private carriers, while the NTC grants specific authority.

#### (1) The Department of Transportation and Communications (DOTC)

The DOTC was created by Executive Order (EO) 546, dated July 27, 1981. Executive order 125, as amended by EO 125A, reorganized the Department in April 1987. Its mission is to provide and regulate a dependable and coordinated network of transportation and communications systems and to provide fast,

Figure 3.1-1 Structure of Telecommunications Sector



efficient, and reliable postal, transportation, and communication services.

(2) National Telecommunications Commission (NTC)

The NTC's regulatory function is carried out by issuing licenses to operate telecommunication systems and facilities and by monitoring compliance with rules and regulations.

It is responsible for developing an effective and efficient Frequency Spectrum Management and Monitoring System and a set of policies that are responsive to changes in telecommunications technology. This system is based on a continuing research program for the updating of telecommunications rules and regulations in accordance with the latest technology.

(3) The Telecommunications Service Office (TELOF)

The TELOF provides telecommunication facilities and services nationwide to augment limited or inadequate facilities and services. It provides several services to the general public: telegraphic transfer, telegraph messages, and telephone lines/units, particularly in areas where the private sector has not ventured. It also offers training courses on the use of sophisticated telecommunications equipment, such as optical fiber and related telecommunication facilities.

(4) The Municipal Telephone Projects Office (MTPO)

The MTPO was established by the Municipal Telephone Act (RA 6849) to implement a nationwide plan to install telephones in every unserved municipality. RA 6849 gave qualified private telecommunication operators the first option to provide, install, and operate public calling stations in all unserved municipalities.

### **3.1.2 Private Sector**

The private sector plays a major role in the telecommunications industry: it has accounted for the bulk of investments to-date and handles most of the country's telecommunications traffic. While the broadcast sector is considered separate from the telecommunications sector, the two sectors overlap in that the broadcast sector is a major user of telecommunication services. Also, broadcast franchises, licenses, and frequency assignments are issued by the NTC.

The Philippine Long Distance Telephone Company (PLDT) is the largest of 47 entities providing telephone services in the Philippines. It has a network of 127 exchanges serving Metro Manila and 133 other cities and municipalities. As of the end of 1992, it had 1,175,332 telephones in service, representing approximately 94% of all telephones in the country. It is the principal supplier of long distance (national and international) services in the Philippines.

### **3.2 Development Program**

#### **3.2.1 Government Sector**

##### **(1) National Telephone Program**

The National Telephone Program --- a part of the Telecommunication Master Plan for the whole country --- will provide telephone lines primarily in unserved and inadequately served areas.

##### **(a) NTP Phase 1 - Tranche I-1 (Regions 3, 4, and 5)**

This project is providing 66 new digital exchanges in 65 cities and municipalities and will install 59,150 subscriber lines in Regions 3, 4, and 5. It is also providing a backbone network connected with other NTP networks, creating a national interconnected network covering Region 3 to 12.

This project was financed by Japanese ODA and is expected to be completed in 1994.

##### **(b) NTP Phase 1 - Tranche I-2 (Regions 6, 7, and 8)**

This project is providing subscriber lines in Regions 6 (Western Visaya), 7 (Central Visaya), and 8 (Eastern Visaya) and a backbone network for these regions. In April 1989, the DOTC and a French consortium signed a contract for the implementation of a pilot project for Region 8 and the complete detailed engineering for Regions 6, 7, and 8.

The complete package was financed under French protocol. The pilot project for Region 8 is providing digital exchanges for the cities of Catarman, Catbalogan, Ormoc, and Borongan and the related transmission facilities to interconnect these exchanges. They will later be integrated into the overall Visaya network. Due to limited funds, the pilot project was split into two

parts: Catarman/Catbalogan/Ormoc (July 1989 contract) and Spur/Borongon (April 1991 contract). It was initiated in October 1992.

The rest of the Tranche I-2 project covers 20 cities/municipalities that have a total capacity of about 20,000 lines, with individual exchange capacities ranging from 300 to 4,500 lines.

(c) NTP Phase I Tranche I-3

The Italian government, under a memorandum of understanding (MOU) entered into on April 22, 1988 between DOTC and ITALTEL, pledged to support the pilot project for the cities of Iligan and Marawi and detailed engineering services for the entire area under NTP Phase I, Tranche 1-3. The contract was signed on May 9, 1989 between DOTC and ITALTEL and was approved by the Office of the President on September 20, 1989.

The NTP I-3 pilot project in Iligan and Marawi was initiated in January 1993. The financial convention under the Italian Protocol of 1987 were reviewed by the interagency Committee of Foreign Loan Documents and forwarded by the Department of Finance to the Italian Embassy on February 12, 1990.

NTP I-3 will eventually provide 43,900 telephone lines to 32 cities and municipalities.

(2) RTDP-C (Regional Telecommunications Development Project Phase C)

Under the RTDP Phase-A project, 11,000 lines and 17 exchanges were installed and completed in September 1986. Under Phase B, 8,240 subscriber lines and 11 exchanges were installed and completed in 1991.

The proposed Phase C project has two objectives.

- i) Expand existing facilities: install three new local exchanges with 2,050 lines and expand 15 local exchanges to handle 5,750 more subscriber lines
- ii) Improve and rehabilitate existing facilities

This project, which includes engineering services, began in June 1993 and is financed by the Japanese, the Overseas Economic Cooperation Fund (OECF).

(3) **Municipal Telephone Program (MTP)**

This program was created by the Municipal Telephone Act of 1989 (Republic Act 6849) and calls for establishing PCOs in all municipalities without telephone service. It is being administered by the MTPO. Projects undertaken by the MTPO are funded with appropriations set forth in the Act and also with ODA funding from the French, Canadian, U.S., and German governments.

The provision of PCOs is a joint effort between the government and participating private telecommunication companies. As of September 1993, 560 PCOs have been established under the MTP.

Table 3.2-1 shows the number of provincial areas handled by private companies and the MTPO and the number of PCOs they have.

Table 3.2-1 MTP Operators and Number of PCOs  
(September 1993)

Operator	No. of Provinces	No. of PCOs
PLDT	11	158
PT&T	13	231
DIGITEL	4	23
PILTEL	1	4
EVTELCO	1	37
Others	-	36
MTPO	46	762
Total	76	1251

source: Brief Project Update (MTPO)

### 3.2.2 Private Sector

The PLDT has several expansion programs, including provision of local and toll facilities nationwide under the X-5, X-5 Complementary, and X-6 expansion programs, and other special projects not covered by these packages.

(1) X-5 Program

The X-5 program covering the period 1989 to 1992, was phase 5 of PLDT's program to improve and modernize services. It provided 135,000 lines and 40 new exchanges throughout the country.

(2) X-5C (Complementary) Program

The X-5C program is composed of a fast-track program and a balanced program. The fast-track program is to install 142,000 additional lines in Metro Manila areas that have many waiting applicants. It was expected to be completed by the end of 1993. In addition to 142,000 lines in Metro Manila, 400,000 lines are expected to be installed under the X-5C program by 1995.

(3) X-6 Program

The X-6 program will run from 1994 to 1997 and provide 586,600 new digital lines in 124 exchanges nationwide. It will expand international and domestic switching/toll facilities to include backbone systems and will expand transmission supervisor systems and network management systems. It is expected to eliminate the demand backlog for 600,000 telephones in the Metro Manila area and to satisfy new demand.

### **3.3 Financial Situation**

This section focuses on the financial performance and the rate structure of the telecommunications sector.

#### **3.3.1 Financial Performance**

Following is the financial performance of the telecommunications carriers. It is analyzed in terms of their investment, profitability, stability and growth.

(1) General

The carriers can be divided into three groups. There is a dominant carrier, PLDT, there are several big carriers, mainly record carriers (international and domestic),

and there are many small carriers. Table 3.3-1 shows the financial performance of telecommunications carriers from 1989 to 1991. More detailed data on financial performance is given in Appendix 3.

(2) Investment

Telephone density is quite low and there are more than 800,000 application for service. Moreover, the demand for new services, such as CMTS, is quite large. Total investment is increasing each year to meet these demands. Investment in the telecommunications sector reached its highest amount in 1991: over 75 billion pesos in 1991. This was 14% higher than the previous year and twice as much as in 1988; 85% of the amount was invested by PLDT.

Followings are investment amount of major operators in 1991.

(a) PLDT	64,679 million peso
(b) ETPI (International Record Carrier)	2,502 million peso
(c) PT&T (Domestic Record Carrier)	1,700 million peso
Total (60 companies)	75,692 million peso
Average (60 companies)	1,262 million peso

The average rate of return on investment declined due to increased interest expenses as well as expanded investments. Only the four IRCs managed to obtain rates of return above the legally permitted 12%. None of the telephone operators, including PLDT, has reached the permitted rate over the last ten years.

(3) Profitability

PLDT had 76% of the total operating income in the sector. It has successfully held operating expenses fairly constant in relation to revenue. Increases in operating expenses were offset by continued growth in local service revenues and by increases in the volume of international and domestic long distance service.

The small telephone operators and the domestic record carriers, on the other hand, experienced an increasing ratio of operating expenses to operating revenues, leading to declining profits. They generally had low service volumes and consequently low revenues. 18 companies out of the 40 showed an average loss for the past 10 years. Low tariff rates and minimal revenue from long distance



Table 3.3-1 Financial Performance of Telecommunications Carriers

TYPE OF CARRIER	Investments		Expenses		Income		Operating Income		
	1989	1990	1989	1990	1989	1990	1989	1990	
International Record Carrier									
1 Globe Telecom	478,326,959	584,603,766	219,816,366	240,483,615	5,288,026	350,138,816	-214,528,340	109,655,201	101,831,241
2 PHILCOM	692,410,000	459,340,000	376,348,000	403,484,000	847,029,000	935,973,000	470,681,000	532,489,000	697,357,000
3 CAPWIRE	51,412,302	81,816,219	59,478,102	64,876,185	67,634,519	78,425,582	49,267,325	13,549,397	7,426,944
4 ETPL	797,937,391	2,248,541,605	389,637,278	499,318,331	634,994,120	1,000,351,335	245,356,842	501,033,004	880,519,784
Total	2,020,086,682	3,374,301,590	1,045,279,746	1,208,162,131	1,497,521,923	2,364,888,733	452,242,177	1,156,726,602	1,687,134,969
Domestic Record Carrier									
1 PT&T	1,197,627,530	1,436,661,618	245,357,878	301,311,067	332,667,043	381,894,804	87,309,165	80,583,737	89,510,366
2 RCPI	157,748,624	140,931,229	154,770,684	160,883,011	157,103,728	162,510,708	2,333,044	1,627,697	4,794,861
3 BFC	36,105,470	94,135,728	30,770,808	71,654,509	22,916,918	75,915,312	-7,853,890	4,260,803	26,414,953
4 CLAVECILLA	-	155,232,055	-	-	-	-	-	0	-5,441,561
Total	1,391,481,624	1,826,960,640	430,899,370	533,848,587	512,687,689	620,320,824	81,788,319	86,472,237	115,278,619
Coastal Services									
1 MICROWAVE	-	-	-	-	-	-	-	0	0
2 AZ COMMUNICATION	180,800	150,476	453,231	475,974	738,560	781,456	285,329	305,482	315,623
3 KAYUMANGUI RADIO NET.	1,459,933	1,459,933	746,780	681,806	783,316	666,259	36,536	-15,547	-42,511
4 CANUTO ORTEGA	73,989	73,989	24,675	25,800	25,000	23,826	325	-1,974	-2,305
5 S. LUSTRE	3,477,826	3,477,826	2,341,912	2,326,302	2,651,895	2,596,352	309,983	270,050	310,717
6 T. ROMASANTA	2,157,764	7,683,905	50,654	2,744,242	52,524	3,010,708	1,870	266,466	266,466
7 GLOBAL COMM.	3,426	779	109,147	111,519	157,683	161,385	48,536	49,865	53,651
8 HYPERSONIC	456,823	456,823	146,193	146,193	154,896	154,896	8,703	8,703	9,266
Total	7,810,561	13,303,730	3,872,592	6,511,836	4,563,874	7,394,881	691,282	883,045	928,529
Other Services									
1 DOMSAT	245,447,372	191,385,062	-	69,660,680	-	34,066,071	0	-35,594,609	-57,392,721
2 Philcomsat	1,034,303,640	1,612,089,951	317,574,069	185,046,358	462,363,653	777,813,718	144,789,584	592,767,360	719,285,770
3 OWNI	110,126,316	183,398,527	32,392,625	44,018,385	49,667,463	62,906,440	17,274,838	18,888,055	21,626,509
4 LBNI	6,649,090	363,147	11,028,933	11,252,973	13,374,630	14,009,769	2,347,697	2,757,390	3,974,881
5 Phil. Wireless	1	67,812,482	113,981	30,413,043	175,170	37,088,294	61,189	6,675,251	9,178,896
Total	1,151,079,047	2,109,111,479	361,107,608	340,390,845	525,580,916	925,884,292	164,473,308	585,493,447	696,673,335
Telephone Companies									
1 Balangas Tel. System	234,092	714,157	207,172	180,406	167,161	147,273	-40,011	-33,138	-144,700
2 Bataan Tel. Exchange	601,576	554,664	316,724	347,251	229,976	315,266	-86,748	-31,985	66,390
3 Bicol Tel. Co.	717,968	744,373	253,799	248,990	264,326	261,878	10,528	12,888	35,599
4 Butuan City Tel. Co.	5,857,216	5,857,216	2,852,272	2,852,272	3,201,052	3,201,052	348,780	348,780	-49,546
5 Calapan Tel. Co.	3,810,795	3,810,795	920,330	920,330	848,278	848,278	-72,052	-72,052	35,431

TYPE OF CARRIER	Investments		Expenses		Income		Operating Income	
	1989	1990	1989	1990	1989	1990	1989	1990
Name	1989	1990	1989	1990	1989	1990	1989	1990
6 Calauag Tel. System	1,476,808	1,395,408	334,479	608,779	282,278	539,452	-52,201	-69,327
7 Calbayog Tel. System	2,209,542	2,209,542	702,701	710,624	262,583	267,127	-440,118	-443,497
8 Cruz Tel. Co.	30,856,363	29,216,480	4,548,485	6,189,247	6,521,238	8,376,431	1,972,754	2,187,184
9 Daclicom	75,470,267	86,867,934	9,805,403	11,089,625	13,904,039	8,493,324	-3,586,906	-2,596,301
10 Digtel	298,165	9,332,884	-	-	-	-	0	0
11 Evangelista Tel. Co.	196,019,144	194,397,887	16,683,754	17,615,676	20,380,126	16,924,436	-2,320,290	-691,240
12 General Tel. Co.	4,716,544	4,716,544	1,043,232	1,043,233	1,043,233	1,090,958	47,753	47,725
13 De Claro Tel. System	1,431,787	1,499,927	425,553	418,428	-	726,341	112,399	307,913
14 Independent Tel. System	2,450,199	2,570,205	962,548	1,194,577	1,722,915	1,410,950	154,996	216,373
15 Iriga Tel. System	2,665,880	4,225,976	235,092	1,277,389	1,277,389	1,225,589	200,962	-51,800
16 Metro Kidapawan	1,519,948	2,399,721	1,032,437	1,868,686	1,691,932	1,872,862	-15,163	4,176
17 Labo Tel. Sys.	-	575,692	-	102,002	146,026	117,030	0	15,028
18 Lukban Tel. System	205,102	2,510,370	913,899	1,647,594	1,758,881	1,691,120	241,111	43,526
19 Maranao Tel. System	22,015,219	22,099,480	5,039,865	5,756,504	6,798,440	5,965,491	-143,239	208,988
20 Marbel Tel. System	1,084,528	108,168	475,918	469,109	606,485	553,771	131,635	84,662
21 Mati Tel. System	2,231,325	2,231,325	832,569	832,569	1,115,464	1,047,246	214,677	214,677
22 Mayon Tel. System	36,140,150	59,714,468	5,060,991	8,062,590	7,812,589	7,958,466	-356,813	-104,124
23 Naga Tel. Co.	7,568,575	8,695,421	3,199,158	4,373,074	5,285,991	109,870	-3,127,709	-4,263,205
24 North Camarines Tel. Sys.	647,183	784,567	798,628	917,247	1,166,682	-	-798,628	-917,247
25 Northern Tel.	1,024,448	1,199,234	1,370,742	1,332,059	1,625,724	45,830	-1,324,893	-1,247,030
26 Nationwide (Jolo Tel.)	250,000	250,000	144,180	139,141	134,770	191,940	38,655	52,800
27 Ormoc City Tel. Co.	23,000,466	20,121,121	2,445,833	2,868,764	3,906,748	27,202	-2,427,704	-2,841,561
28 PILTEL	349,354,186	356,541,239	40,929,577	48,819,219	277,668,214	78,440,551	24,332,259	29,621,332
29 Pampanga Tel.	421,146	1,049,229	347,321	543,694	943,725	567,352	12,162	23,658
30 R.C. Yulo Tel. Sys.	388,742	432,997	252,027	278,216	485,538	290,608	8,153	12,392
31 Radio City Tel. Co.	2,357,749	11,250,218	2,681,045	7,565,838	8,109,395	7,581,644	-629,918	15,806
32 Rural Tel. Co.	552,000	552,000	210,852	213,522	213,522	253,091	20,058	39,569
33 San Carlos Tel. Sys.	487,213	487,273	58,230	58,230	84,760	60,481	2,251	2,251
34 Southern Telecom, Inc.	3,847,973	4,772,068	587,606	1,027,039	799,464	811,820	26,231	-215,219
35 Tandag Tel. Co.	52,448	52,448	-	-	-	-	0	0
36 Telecom Mgt. & Services	1,161,594	1,434,134	671,501	665,435	1,585,225	684,293	49,608	18,858
37 Western Batangas Tel.	2,843,013	4,837,899	1,043,605	1,425,067	1,978,575	1,357,545	-916,272	-67,522
38 Sub-Total	785,969,355	850,213,065	107,387,529	133,662,424	377,393,314	153,495,766	11,606,309	19,833,342
39 PLDT	40,709,029,984	58,299,202,955	5,460,707,864	7,479,166,150	8,588,337,448	13,057,970,013	4,213,970,442	5,578,803,863
Total Telephone Cos.	41,494,999,339	59,149,416,020	66,899,411,156	7,612,828,574	8,965,730,762	13,211,465,779	4,225,576,751	5,598,637,205
60 TOTAL	46,065,457,223	66,473,099,459	75,692,362,587	7,409,254,708	10,793,241,455	17,129,954,509	7,428,212,537	10,865,958,957

Source: NTC, CCAD Report

service further hampered their earning capacity. In addition, their use of outdated equipment meant higher maintenance costs.

Followings are operating income of major operators in 1991.

(a) PLDT	8,227 million peso
(b) ETPI (International Record Carrier)	881 million peso
(c) Philcomsat (Other Service)	719 million peso
Total (60 companies)	10,866 million peso
Average (60 companies)	181 million peso

#### (4) Growth

The telecommunications market is growing quite rapidly. In 1991, the total operating revenue was 21,659 million pesos, an increase of 26% compared to the previous year. This is as ten times as much revenue as in 1982. The telecommunications sector grew 26% per year on average, over the decade ending in 1987. This growth was accounted for mainly by the big telecommunications companies, particularly PLDT and the international record carriers. Rapid growth will constant until at least the waiting applicants are served.

Followings are growth rate of operating revenue of major operators in 1991.

(a) PILTEL (Telephone Company)	443%
(b) PLDT	29%
(c) Philcomsat	23%
Average (60 companies)	26%

### 3.3.2 Rate Structure

#### (1) Determination of Rate

The NTC determines the rates for telecommunications services based on return on rate base and make adjustment against foreign currency adjustment. The rate structure is determined by the following:

(a) Return on Rate Base

The Supreme Court decided in the early 1930s that a 12% return is fair and responsible and the NTC has set the authorized maximum return at 12%. The rate base is composed of two items:

- i) net book value of property, plant and equipment in service (property, plant and equipment minus accumulated depreciation) as of balance sheet date or as of the end of test period; and
- ii) working capital equivalent to two (2) months average operating expenses after deducting taxes and other non-cash items from the total allowable operating expenses. The allowable revenue should be within the 12 % return on the rate base plus the total allowable operating expenses, if it was incurred from the loan approved by the NTC.

(b) Foreign Currency Adjustment

Foreign currency adjustment, which is subject to NTC approval, is an automatic mechanism by which rate base determined by the commission is changed based on peso/dollar exchange fluctuations. A carrier can make an adjustment by notifying the NTC; a hearing is not needed. The foreign currency adjustment is fixed at 1% for every 0.10 pesos upward or downward fluctuation in the dollar-peso exchange rate. A foreign currency adjustment is granted based on the premise that carriers should be encouraged to improve their existing facilities and that they should be aided in the payment of their foreign dominated loans.

(2) Basic Telephone Service

Basic telephone service comprises local service and long distance services (domestic and international).

(a) Local Service

The Philippines generally has a fixed rate structure for local service. Only two regulated companies (PILTEL and Digitel) are using usage-based charges for local calls.

The rate level varies from one operator to another. Rates in rural areas range from as low as 50.00 pesos, for a residential line using manual equipment, to as high as 190.00 pesos, using a digital system. Rates in the urban areas are higher than those in rural areas. PLDT charges in Metro Manila, except for the Ex-Retelco areas is 570.36 pesos for business as of June 29, 1993. Governmental operators are not supervised by the NTC, so they can determine their tariffs. Sample of rate for local service is shown in Table 3.3-2.

Table 3.3-2 Sample of Local Telephone Service Rates

Operator	Residential	Business
PLDT for Metro Manila	251.30	570.36
PLDT for Luzon	226.27	427.20
PLDT for Davao and Manila	276.67	462.80
BALAGTAS Telephone System	60.00	80.00
PILTEL for Olongapo (*Note)	191.47	382.94

\*Note : PILTEL (Pilipino Telephone Corporation) uses billable periodic pulse metering for local service. The subscriber pays 0.62 pesos per pulse for all pulses greater than 200.

Source: NTC

(b) Long Distance Service (Domestic and International)

Long distance service fees independent of the monthly subscription fees are based on duration and call distance. Rates for long distance call service are the same. PLDT has the major share of the market and the other follow PLDT's lead in setting.

A 10% overseas communications tax is charged on every international calls paid for in the Philippines. Rate for domestic long distance service is shown in Table 3.3-3.

Table 3.3-3 Rate for Domestic Long Distance Service

Effective December 16, 1991

Step	Airline Distance (in kilometers)	Direct Distance Dialing				Operator Assisted				Report Charge		
		Weekdays		Night & Sun.		Weekdays		Night & Sun.				
		first min.	add'l min.	first min.	add'l min.	first 3 mins.	add'l 3 mins.	first 3 mins.	add'l min.			
01	0 to less than 36	2.00	0.50	2.00	0.35	8.00	4.00	1.65	0.55	1.20	0.40	4.50
02	36 to less than 76	2.00	1.30	2.00	0.95	8.50	4.25	4.35	1.45	3.15	1.05	4.50
03	76 to less than 120	2.35	2.15	2.00	1.45	9.00	4.50	7.20	2.40	4.80	1.60	4.50
04	120 to less than 170	3.25	2.95	2.35	2.15	9.50	4.75	9.75	3.25	7.20	2.40	4.50
05	170 to less than 240	4.20	3.80	2.85	2.55	10.00	5.00	12.60	4.20	8.55	2.85	4.50
06	240 to less than 350	5.05	4.55	3.60	3.30	10.50	5.25	15.15	5.05	10.95	3.65	4.50
07	350 to less than 480	5.95	5.35	4.20	3.80	11.00	5.50	17.70	5.90	12.60	4.20	4.50
08	480 to less than 635	6.85	6.15	4.85	4.35	11.50	5.75	20.40	6.80	14.40	4.80	4.50
09	635 to less than 810	7.70	7.00	5.40	4.90	12.00	6.00	23.10	7.70	16.20	5.40	4.50
10	810 to less than 985	8.65	7.85	6.10	5.50	12.50	6.25	25.95	8.65	18.15	6.05	4.50
11	985 to less than 1,170	9.35	8.45	6.45	5.85	13.00	6.50	27.90	9.30	19.35	6.45	4.50
12	1,170 and over	10.65	9.65	7.35	6.65	13.50	6.75	31.95	10.65	22.05	7.35	4.50

Regular Day Rate Monday to Saturday 7:00 am-6:59 pm

Source: NTC

(c) Subscriber Investment Plan (SIP)

The SIP program was adopted by PLDT and PILTEL in compliance with Presidential Decree No. 217 of 1973 which requires telephone companies in the Philippines to share ownership of the company with as many subscribers as possible.

Table 3.3-4 shows the required minimum amount for SIP for each type of service.

Table 3.3-4 Required Minimum Amount for SIP

Type of Service		Amount of Investment (pesos)
Residential Service	Two-party line	900
	Single line	1,800
Business Service	Two-party line	2,000
	Single line	3,500
Switchboard Service	Per trunk	5,000
	Leased line	2,500

Source: White Pages 1993-1994 Metro Manila Telephone Directory

(3) CMTS

The rate for cellular mobile telephone service (CMTS) in PLDT is as follows:

(a) Non-Recurrent (pesos)

i) Subscriber Investment	3,500.00
ii) Deposit on Instrument	700.00
iii) Installation Charge	300.00

(b) Recurrent (pesos/month)

i) Basic Service Charge	1,152.00
(same charge for subscriber with own unit.)	
ii) Rental for Instrument	
- Vehicle Telephone	948.00
- Portable Telephone	1,197.00

(c) Usage Charge per Call

Table 3.3-5 shows the usage charge per call for CMTS.

Table 3.3-5 Usage Charge per Call for CMTS

(in pesos, as of December 16, 1991)

Distance (in kilometers)	Direct Dialed		Operator Assisted			
	first min.	add'l min.	Person first	Station 2 min.	add'l min.	Report Charge
Up to 100	4.50	3.00	12.00	8.00	4.00	4.50
101 - 250	6.00	4.00	18.00	12.00	6.00	4.50
25 1 - 600	8.00	6.00	27.00	18.00	9.00	4.50
600 - 1000	10.00	8.00	36.00	24.00	12.00	4.50
Over 1000	12.00	10.00	45.00	30.00	15.00	4.50

Source: PLDT



## **CHAPTER 4**

# **PRESENT STATUS OF TELECOMMUNICATION SERVICES**



## **CHAPTER 4 PRESENT STATUS OF TELECOMMUNICATION SERVICES**

Telecommunications in the Philippines is a competitive industry; a number of carriers provide various services.

### **4.1 Telephone Services**

There are about 887 thousand telephone subscribers in the Philippines as of the end of 1992. Telephone availability varies widely: from 10 telephones per 100 inhabitants in Metro Manila to less than 2 for other cities and 0.1 for the rest of the country.

#### **4.1.1 Local Exchange Service**

Local exchange service is provided by 42 private telephone operators and 5 government carriers (local governments and TELOF). The largest private operator is PLDT (Philippine Long Distance Telephone Company), which provides service to approximately 94 % of the total telephone sets. Existing telephone networks cover about 330 of the 1597 municipalities and cities, about 20 % coverage ratio.

Public Calling Offices (PCOs) are being installed in cities and municipalities that do not have telephone service. The Municipal Telephone Project Office (MTPO) was established by the Municipal Telephone Act (RA 6849) to implement a nationwide plan to install public telephones in every unserved municipality. As of September 1993, 560 PCOs had been established.

Local exchange services have several problems, including the following:

(a) Large applicant backlog (about 800,000)

In Metro Manila, alone, there are about 600,000 backlogged service applications. Since Metro Manila is both the capital of the Philippines and its economic center, therefore, telecommunication service is essential. Some companies are planning to provide cellular mobile telephone service especially in Metro Manila, instead of basic telephone service because of high basic telephone backlog.

(b) Poor quality service

The subscriber complaint rate is high; about 13 per 100 telephones each month.

(c) Isolated local exchanges

Some local exchanges are isolated from PSTN. Most of them will be interconnected by the National Telephone Program (NTP): Tranche 1-1, 1-2, and 1-3.

Interconnection problems include:

- (i) insufficient circuits volume, and
- (ii) faulty or poor quality interconnection circuits.

#### 4.1.2 Long Distance Service

(1) Domestic

PLDT has an extensive nationwide backbone network. The government is providing an alternate backbone network, installed by RTDP (Regional Telecommunications Development Project) and NTP (National Telephone Program). PT&T, RCPI, and DIGITEL also provide smaller scale national networks. Digital transmission equipment is primarily used; PLDT plans to introduce digital optical fiber routes in its X-5C and X-6 plans.

Problems with long distance service include:

- (a) isolated local exchanges as discussed in section 4.1.1, and
- (b) insufficient volume of networks, especially interconnections with local networks.

(2) International

The international carriers, PLDT, ETPI, and PHILCOM, have their own gateway facilities. Most of PLDT's profits come from international telephone services.

## **4.2 Mobile Telecommunication Services**

Mobile telecommunication services are regulated by the National Telecommunications Commission (NTC). Licenses for networks are also awarded by the NTC.

### **4.2.1 Cellular Mobile Telephone Service**

#### **(1) Analog Cellular Mobile Telephone System (CMTS)**

There are two analog CMTS providers in the Philippines. One system is operated under the brand name "Mobiline" by PILTEL, a PLDT subsidiary that effectively took over PLDT's CMTS service after PLDT's initial CMTS ran out of capacity. The other system is operated by EXTELCOM. Both companies have been granted authority to provide CMTS service nationwide using the US. AMPS technology.

PILTEL's CMTS has 21 cell sites providing service in Metro Manila and Luzon, and three cell sites in the Visayas area (two provide service in Cebu and the other in Iloilo City). Mobile switching centers have also been established in Metro Manila (2) and in Cebu (1).

EXTELCOM's CMTS went into full commercial operation in 1991 after overcoming numerous problems with interconnection to the PSTN. This system has about seven cell sites in Metro Manila. Service provision outside Metro Manila, notably in Cebu City and areas adjacent to Metro Manila, was expected to be available towards the end of 1993.

Smart Information Technologies, Inc. (SMART), Globe Telecom and Isla Communication Co. (Islacom) were issued provisional authority to operate a nationwide cellular mobile telephone service by the NTC in 1993. SMART began operation in February 1994 and used the TACS standard.

At the end of 1992, there were 55,920 cellular subscribers in the Philippines. Table 4.2-1 summarizes the basic information for the two providers.

(2) Digital CMTS

Digital cellular mobile telephone service is not yet available in the Philippines. However, PILTEL has introduced time division multiple access technology, the latest development in digital technology, in Metro Manila and will soon implement digital CMTS on its nationwide network. Globe Telecom and Islacom will introduce the GSM digital cellular system.

Table 4.2-1 Cellular Mobile Telephone Service Operators

Operator	Service begun	System Technology	Number of subscribers (year-end 1992)
PILTEL	1991	AMPS-A	47,080
EXTELCOM	1991	EAMPS-B	8,840
Total			55,920

Source: PILTEL and EXTELCOM

#### 4.2.2 Radio Paging Service

Six companies have been licensed to provide public radio paging service in the Philippines. Only three (POCKETBELL, EASYCALL, and DIGIPAGE), however, have services in operation. The remaining three are installing their networks. EASYCALL broke POCKETBELL's monopoly of paging service in 1992. At the end of 1992, there were 71,758 subscribers. Table 4.2-2 shows the full list of licensed paging companies and their coverage areas.

(a) POCKETBELL

POCKETBELL is the oldest provider; they launched a tone paging service in 1975. Most POCKETBELL subscribers are located in Metro Manila, but the network is gradually expanding to other cities. POCKETBELL now offers an hourly news update service. At the end of 1992, they had 24,301 subscribers.

(b) EASYCALL

EASYCALL launched its service in March 1989 with a network based in Metro Manila. It is being rolled out nationwide. The backbone network is a satellite network. They had 44,807 subscribers at the end of 1992.

(c) DIGIPAGE

DIGIPAGE began operations in 1991 and at the end of 1992 had 2,650 subscribers.

Table 4.2-2 Licensed Paging Companies

Company (Service Name) (Established, Coverage Area)	Subscribers (1992)	Service
Easy Call Philippines, Inc. (EASYCALL) (1989, Nationwide)	44,807	Alphanumeric Display
Philippine Wireless, Inc. (POCKETBELL) (1975, Nationwide)	24,301	Tone, lphanumeric Display
T. N. Romasanta, Inc. (DIGIPAGE) (1991, Metro Manila)	2,650	Numeric Display
Satellite Paging Systems Philippines, Inc. (Metro Manila)		Implementation on-going
Segundo P. Lustre, Jr. (Metro Manila)		Implementation on-going
Pilipino Telephone Corporation (Nationwide)		Implementation on-going
<b>Total</b>	<b>71,758</b>	

Source: NTC 1992 Annual Report

### 4.2.3 Public Mobile Radio Communication Services

Public mobile radio communication services are provided through shared repeater/trunked networks, operating in the VHF and UHF bands, which make more efficient use of a common pool of channels. A channel is assigned to an authorized user by a system processor which finds a free channel and allocates it to the user for the duration of the call. However, a complete "hands off" capability is not provided: an operator is required for some types of calls. There are seven authorized shared repeater/trunked network providers, but only two of them have begun service. There were 1938 subscribers at the end of 1991. Table 4.2-3 shows the list of shared repeater/trunked network license holders.

According to the NTC annual report for 1992, PT&T was authorized to operate an enhanced shared repeater/trunked network to be used solely for the establishment and operation of public call offices (PCOs) in 12 provinces as approved by the Municipal Telephone Project Office.

Table 4.2-3 Shared Repeater/Trunked Network License Holders

Company	Number of Subscribers (year-end 1992)
Liberty Broadcasting Network, Inc. (LBNI)	1,890
Teodoro N. Romasanta, Inc. (TNRI)	48
Segundo P. Lustre, Jr.	Construction On-going
A Z Communications	Construction On-going
Omninet Philippines, Inc.	Implementation Stage
International Communications Corp. (ICC)	Implementation Stage
Contel Communications, Inc.	Implementation Stage
<b>Total</b>	<b>1,938</b>

Source: NTC 1992 Annual Report

There are several private mobile radio (PMR) systems, many of which can be automatically or manually patched into the PSTN. This system is used for voice (sometimes data) communications, usually operating on a local basis. It only has a small number of allocated channels, so a mobile user has to wait until a channel is clear before using it. At the end of 1992, there were 9,339 PMR base stations and 17,183 mobile units in operation.

#### 4.2.4 Maritime Mobile Services

Maritime transport and hence, maritime communications, are vital in the Philippines, as it is an archipelago country consisting of more than 7,000 islands. Maritime mobile service is provided through public coastal stations, both private and government. Private coastal stations were consolidated into the Maritime Radio Communications Association of the Philippines, Inc. (MARC-API), which handles only private communications. About 20 coastal radio stations handled about 2,000 vessels at the end of 1991. By the end of 1992, there were only 15 public coastal stations but over 4,944 vessels.



A project is underway to introduce the Global Maritime Distress and Safety System, a new global system to enhance the safety of life at sea through improved communications.

#### 4.2.5 Aeronautical Mobile Telephone Service

PLDT is the only provider of aeronautical telephone service with its Skyphone. This service allows users to place or receive direct-dial or operator-assisted calls between the ground and satellite-communication-equipped aircraft flying over selected regions.

### 4.3 Record Carrier Service

Telegraph and telex services are main services in this category. They are handled by PT&T, RCPI and TELOF domestically, and CAPWIRE, ETPI, Globe Telecom, and PHILCOM internationally.

#### 4.3.1 Domestic Record Services

The total volume for domestic telegraph in 1990 was 12.5 million messages. PT&T handled 53% of them.

There were only 400 domestic telex subscribers in 1990. The traffic was 2 million minutes. PT&T handled 85%.

Table 4.3-1 summarizes the traffic handled by the domestic record carriers in 1990.

Table 4.3-1 Total Number of Stations and Traffic Volume of Domestic Record Carriers in 1990

Carrier	No. of Telegraph Stations	Telegraph Volume (messages)	% of Total	No. of Telex Stations	Telex Volume (minutes)	% of Total
PT&T	323	6,676,073	53	70	2,526,720	85
RCPI	332	2,493,737	20	35	427,735	15
TELOF	1,660	3,339,000	27	1	0	0
<b>Total</b>	<b>2,315</b>	<b>12,508,810</b>	<b>100</b>	<b>106</b>	<b>2,954,455</b>	<b>100</b>

Source: National Telecommunications Commission (NTC)

### 4.3.2 International Record Services

The total volume for international telegraph in 1990 was about two million words. CAPWIRE has the biggest share. There were about 7,000 international telex subscribers in 1990. The traffic was five million minutes. PHILCOM, ETPI and Globe Telecom, each handled 32%-33%.

In line with world trends telegraph and telex traffic is decreasing, as telephone and facsimile traffic increases.

In the Philippines, there are exclusive facsimile networks served by CAPWIRE, PHILCOM, ETPI, and GMCR. They have a store and forward function in the network. Total traffic in 1990 was about 870,000 pages. GMCR had the biggest share (47%). Facsimile is attractive because of its low price and special functions. Table 4.3-2 summarizes the traffic handled by the international record carriers in 1990.

Table 4.3-2 Traffic Volume of International Record Carriers

Operator	Telex	Telex	Telegraph	Facsimile
	(minutes)	Subscribers	(words)	(pages)
PHILCOM	1,584,504	2,060	25,913	291,195
ETPI	1,688,200	2,027	355,900	154,200
Globe Telecom	1,648,194	2,500	599,978	410,760
CAPWIRE	88,130	326	897,780	11,026
Total	5,009,028	6,913	1,879,571	867,181

Source: National Telecommunications Commission

### 4.4 Carrier's Carrier

Three carrier's carriers are operating in the Philippines: the Philippine Communications Satellite Corporation (Philcomsat), the Domestic Satellite Philippine Corporation (Domsat), and Oceanic Wireless Network, Inc. These companies lease circuits to other carriers.

#### 4.4.1 International Satellite Service

International telephone service operates through both satellites and submarine cables. Philcomsat was established in 1968 to provide international satellite service. It operates telephone services, television services, and television distribution services, and leased circuits through earth stations located near Manila. At the end of 1991, 1,202 circuits were in operation. Table 4.4-1 summarizes the Philcomsat satellite facilities.

Table 4.4-1 Philcomsat Satellite Facilities

(July 1993)

Earth Station	Utilized Satellite	Channels
Pinugay -01 A (Restoration facility for optical fiber cables)	Intelsat VA	6 x 45-Mbps Carriers
Pinugay -02 A	Intelsat VI	230 ch = Analog, 333 ch = Digital, 30 ch = 64 kbps
Manila -01F2	Intelsat VA	2 x T1 Carriers
PHL001F1	Intelsat VA	1 x T1 Carrier
Cubi Point -01B	Intelsat VA and VI	2 x T1 Carriers
Cubi Point -02B (TV receive only facility)	Intelsat VA and VI	

Source: Philcomsat

#### 4.4.2 Domestic Satellite Service

##### (1) Domsat System

Domsat was established in 1975 and began offering domestic satellite services in 1979. It has a earth control station near Manila (Antipolo) and 11 other stations nationwide. Domsat leases transponder space on the Indonesian Palapa satellite. It has a capacity of 212 FM-SCPC (Frequency Modulation - Single Channel Per Carrier) radio-link channels. At the end of 1992, 156 channels were in service. Table 4.4-2 summarizes the Domsat facilities.