JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DIRECTORATE GENERAL OF POSTS AND TELECOMMUNICATIONS
DEPARTMENT OF TOURISM, POSTS AND TELECOMMUNICATIONS

THE REPUBLIC OF INDONESIA

THE STUDY

ON

TELECOMMUNICATIONS NETWORK DEVELOPMENT PLAN

FOR

REPELITA–VI

FINAL REPORT

(VOLUME I)

FEBRUARY 1993

NIPPON TELECOMMUNICATIONS CONSULTING CO., LTD.
TOKYO, JAPAN

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PREFACE

In response to a request from the Government of the Republic of Indonesia, the Government of Japan decided to conduct a pre-feasibility study on the Telecommunications Network Development Plan for REPELITA-VI and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Indonesia a study team headed by Mr. Hideji Kajikawa, Nippon Telecommunications Consulting Co., Ltd., from March 1992 to February 1993.

The team held discussions with the officials concerned of the Government of Indonesia, and conducted a field survey 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 Indonesia for their close cooperation extended to the team.

February 1993

Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency

February 1993

Mr. Kensuke Yanagiya
President
Japan International Cooperation Agency

Letter of Transmittal

It is our great pleasure to submit to you the Study Report on Telecommunications Network Development Plan for REPELITA-VI in the Republic of Indonesia.

This report has been prepared by Nippon Telecommunications Consulting Co., Ltd., based on a contract with JICA. The study team consisting of 13 members and headed by Mr. Hideji Kajikawa conducted the works from March 1992 to February 1993.

The study aims to formulate the 6th Five-Year Telecommunications Development Plan (1994 to 1998) under the 6th Five-Year National Development Plan in the Republic of Indonesia.

Study objective areas covered the whole country. Through field surveys and analysis of survey results, the five-year plan has been drawn up, including formation of development targets, network and system plans, operation/maintenance plans and implementation plans, as well as cost estimates and project evaluation.

We wish to take this opportunity to express our deep gratitude to the officials concerned of the Japan International Cooperation Agency and other authorities concerned of the Government of Japan. We also wish to offer our sincere appreciation to the officials concerned of DEPARPOSTEL/POSTEL, PT. TELKOM and other related agencies of the Government of Indonesia for their unlimited cooperation and assistance extended to the study team in connection with the execution of their duties.

Before closing, we earnestly hope that this report will be effectively used for further development of telecommunications in the Republic of Indonesia.

Very truly yours,

T. Makiyama

Takeichi Makiyama
President
Nippon Telecommunications Consulting Co., Ltd.

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ACRONYMS AND INITIALS

DEPARPOSTEL:	Department of Tourism, Posts and Telecommunications
POSTEL:	Directorate General of Posts and Telecommunications
PERUMTEL:	Purusahaan Umum Telekomunikasi(present TELKOM) (Public Telecommunications Corporation)
PT. TELKOM:	PT. Telekomunikasi Indonesia(previous PERUMTEL) (State-Owned Limited Liability Company)
WITEL:	Wilayah Usaha Telekomunikasi (Regional Bureau of PT. TELKOM)
WARTEL:	Public Telecommunication Office
REPELITA:	Five-Year Development Plan
Propinsi:	Province
IKP:	Ibu Kota Propinsi (Province Capital)
Kotamadya:	Municipality
Kabupaten:	Regency
IKK:	Ibu Kota Kabupaten (Regency Capital)
Kecamatan:	Sub-District
IKC:	Ibu Kota Kecamatan (Sub-District Capital)
Desa:	Village
PBH:	Revenue Sharing
BOT:	Build, Operation and Transfer
ISDN:	Integrated Services Digital Network
N-ISDN:	Narrowband ISDN
B-ISDN:	Broadband ISDN
IDN:	Integrated Digital Network
IN:	Intelligent Network
PCN:	Personal Communication Network
SKDP:	Packet Switched Public Data Network
PALAPA:	Domestic Satellite System in Indonesia
GENTEX:	Telegram by Telex Network
STKB:	Mobile Telephone System in Indonesia
MTS:	Mobile Telephone System
RSS:	Radio Subscriber System
RSU:	Remote Switching System
DLU:	Digital Line Unit
MHS:	Message Handling Service
PBX:	Private Branch Exchange
STDI:	Digital Switching System in Indonesia
SKKL:	Submarine Cable System
SDH:	Synchronous Digital Hierarchy
ISD:	International Subscriber Dialling
SLDD:	Subscriber Long Distance Dialling
VSAT:	Very Small Aperture Terminal
CCS:	Common Channel Signalling System
SCR:	Successful Call Ratio

ISC:	International Switching Center
TC:	Tertiary Center
TA:	Tertiary Area
SC:	Secondary Center
SA:	Secondary Area
PC:	Primary Center
PA:	Primary Area
LE:	Local Exchange
MEA:	Multi-Exchange Area
GDP:	Gross Domestic Product
GRDP:	Gross Regional Domestic Product
IRR:	Internal Rate of Return
FIRR:	Financial IRR
EIRR:	Economic IRR

VOLUME I
MAIN REPORT

SECTION 1 INTRODUCTION

1. Background

Domestic and international telecommunications services in Indonesia had been operated monopolistically by respective government owned organizations, PERUMTEL and PT. INDOSAT, until just before the commencement of this study.

The telecommunications laws of Indonesia were revised in 1990 and, in consequence, private participation in telecommunications became possible. In the following year, 1991, the P.P. No. 25/1991 was enforced under the revised laws, and PERUMTEL was corporatized into a state-owned limited liability company named PT. TELKOM.

PT. TELKOM now provides domestic services, such as telephone, telegram, telex and leased line services, monopolistically in the same way as PERUMTEL did.

Recently, however, a PBH system (Revenue Sharing) began to be introduced in some districts under the revised telecommunications laws. This PBH system allows private companies to provide telecommunications services in cooperation with PT. TELKOM. The revised laws also permit private companies to provide non-basic services, through resale of lines leased from PT. TELKOM.

Thus the telecommunications sector itself is going to change drastically through the corporatization of PERUMTEL and the approval of input of private funds in the telecommunications sector, etc.

For development of telecommunications, "Long-Term Telecommunications System Development Plan" was prepared by JICA in 1987. This plan proposed the long- and medium-term development plans up to 2004, including the Telecommunications Development Plan for REPELITA-VI. Presently the development program for PELITA-V is being implemented, according to the 1987 JICA Plan and others.

Recently, however, the national economy has achieved a remarkable progress, as can be seen in the development of infrastructure such as power, gas and water supply, etc. In addition, recent change in industrial structure, i.e., transition from oil-dependent economy to industry-dependent economy, has greatly contributed to the enhancement of social and economic activities. As a result, demand for telecommunications has sharply increased beyond all expectations, and the pace of supply of telecommunications facilities is considerably behind the demand growth.

On the other hand, the Government of Indonesia intends to let its national economy take off during the REPELITA-VI period, which is the first REPELITA in the Second Long-Term National Economic Development Phase.

In promoting the development plans, the Government puts priority to the development of telecommunications since the current inadequate telecommunications are regarded as an obstacle to the national development. That is, the Government intends to implement a telecommunications development program in a larger scale than the current long- and medium-term plans so as to fulfill the demand.

Under the above circumstances, the Government of Indonesia decided to prepare a telecommunications network development plan for REPELITA-VI (April 1994 to March 1999) urgently, and requested the assistance of the Government of Japan.

In response to this request, the Government of Japan decided to conduct a Study on Telecommunications Network Development Plan for REPELITA-VI. In consequence, Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a preliminary study team to Indonesia in December 1991, and a study team in March through August, 1992.

1.2 Study Objective and Objective Areas

The objective of the Study is to formulate a Telecommunications Network Development Plan for REPELITA-VI according to the telecommunications long-term development policy. The objective areas of the Plan are the whole territory of the Republic of Indonesia.

1.3 Scope of the Study

Telecommunications network development plans, operation and maintenance plans, and implementation plans for REPELITA-VI have been formulated, based on the results of field surveys and thorough discussions with the staff concerned of PT. TELKOM and DEPARPOSTEL and other competent authorities of the Government of Indonesia.

Studies were made as follows:

(1) Collection and Analysis of Data

The existing data, documents and information on the following were collected and analyzed:

a) Existing Plans/Reports on Telecommunications

The following plans and reports which are considered to present basic policy for telecommunications development planning were thoroughly studied in establishing telecommunications development targets for REPELITA-VI.

- Fundamental Technical Plan
- Strategic Development Plan
- Long-Term Telecommunications Systems Development Plan
- PT. TELKOM's Corporate Plan
- Plans for the Second Long-Term Telecommunications Network Development Phase prepared by PT. TELKOM and DEPARPOSTEL, respectively.
- Others

b) Social and Economic Activities and Statistical Data

Current social and economic activities and industrial structures in Indonesia were investigated. On the basis of the investigation findings, the basic policy and strategy for telecommunications development were formulated. From the statistical data obtained, the growth rates of national economy and population were forecast. These data also served as the basic data for demand forecast.

c) National Development Plans

The priority given to the telecommunications sector in the National Development Plans and the role of telecommunications for promotion of economic and social activities were investigated. The study results were used as the basic data in establishing the policy and targets of telecommunications network development plans.

d) Telecommunications Development Plans and On-going Projects

To estimate the quantity of facilities at the end of the PELITA-V (March 1994) on the assumption of which development plans for the REPELITA-VI are to be formulated, telecommunications systems improvement plans prepared by Directorate of Development and WITEL of PT. TELKOM, as well as the progress of the on-going projects, were

investigated.

In this work, attention was paid to the progress of projects which are to be implemented in the REPELITA-VI period continuously. Projects yet to be implemented but already signed or now ready for tender were regarded as "on-going" projects, and taken into account in estimating the quantity of facilities at the end of PELITA-V. On the other hand, facilities planned under PELITA-V but scheduled to be installed after April 1994 were included in the facilities to be realized under REPELITA-VI.

e) Status Quo of Telecommunications Services and Facilities

Status quo of telecommunications networks and facilities in Indonesia was investigated to obtain basic data for facility development planning. As for the current telecommunications services, their types and quality were investigated. Investigation results were used as the basic data in determining the targets on service quality, etc.

(2) Establishment of Development Target

REPELITA-VI is the first stage of the Second Long-Term Development Phase. Therefore, the long-term development policy, strategy and targets to be achieved by the year 2020 were studied, and the development target (basic component) for REPELITA-VI was set at "achieving the telephone density which is commensurate with the economic level of Indonesia at the end of REPELITA-VI."

In addition, to stimulate the national economy through telecommunications development, an additional investment target (additional component) was formulated.

The overall target (basic plus additional) was set at expansion of telephone facilities with new installation of 5,000,000 line units.

(3) Demand Forecast

The future telephone demand was forecast, through the review of the microscopic demand forecast made by PT. TELKOM, and the macroscopic forecast prepared by the study team. With respect to the microscopic demand forecast, the adopted forecast method was reviewed and forecast results were confirmed, with adjustment wherever necessary. The macroscopic forecast was

made, by applying the CCITT model which represents the correlation among the GDP per capita, demand and supply density. With respect to the demand for non-telephone and mobile telephone services now available in Indonesia, future demands were estimated from the data in various countries in the world.

(4) Formulation of Telecommunications Network Development Plan for REPELITA-VI.

Targets of telecommunications services including new services were established and, based on the demand forecast results, supply plans for respective services were drawn up. The Telecommunication Network Development Plan for REPELITA-VI was formulated, based on the supply plans by services thus prepared and the traffic forecast results. Further, installation plans and operation/maintenance plans were drawn up, based on the Network Development Plan.

(5) Formulation of Implementation Plan and Project Evaluation

Annual facility-based and WITEL-wise implementation plans during the REPELITA-VI were prepared.

Implementation plans present quantity of proposed expansion by facilities, i.e., switching, transmission, subscriber cables, buildings, etc. for each WITEL. According to these plans, individual projects were formulated and implementation plans for these projects were drawn up.

In Indonesia, projects were usually framed for individual facilities independently. That is, there were switching projects, transmission projects, subscriber cable projects, etc. Therefore, a network can hardly function as required until all the relevant projects have been completed, often resulting in delay in inauguration of a network due to the delay in one of the projects involved.

To cope with the above situation, attention was focused on formation of a project which permits by itself the establishment of a regional network.

For each project, financial analysis and economic evaluation were made, based on the estimation of investment costs and revenues. Economic benefits were also studied both qualitatively and quantitatively.

On the other hand, private participation in the telecommunications sector which has already been permitted since 1990 is expected to increase in coming

years. In addition, complete privatization and/or break-up of the executive entity are also under study now.

To implement by far the larger scale investment plans than the previous ones by utilizing private funds, some measures must be taken by the executive entity and/or the Government so as to permit the entity to keep suitable profits.

In view of the above, corporate financial evaluation was also made in the study, to identify impacts of the investments on the executive entity's entire operations.

Since the complete privatization and restructuring in the sector are still under study as mentioned above, the corporate financial evaluation was made on condition that a single telecommunications agency undertakes a domestic telecommunications business monopolistically.

1.4 Composition of Study Report

On the basis of the study results mentioned above, Telecommunications Network Development Plan for REPELITA-VI have been prepared in the form of a Study Report.

The Report is composed of the following:

(1) Summary — Summary of the study results.

(2) Main Reports

a) Volume I — Consisting of:

Development targets, demand forecast, Telecommunications Network Development Plan, and Conclusion and Recommendation.

b) Volume II — Implementation Plans consisting of:

Annual installation plans by exchange.

c) Volume III — Project List and Digest consisting of:

Project areas, investment costs and financial and economic evaluation.

(3) Data Book

Other data and information obtained through the study work, mainly consisting of:

a) Regional demand forecast

b) Status quo of the existing facilities

c) Basic data for network and facility planning

- Regional supply plans
- Traffic forecast
- Required number of circuits
- Required quantity of transmission facilities

d) Construction cost estimates

5. Organization

5.1 Japanese Team

(1) Advisory Committee

Mr. Osamu KOYAMA	: Chairman / Ministry of Post and Telecommunications (until July 1992)
Mr. Kaoru SUZUKI	: Chairman / Ministry of Post and Telecommunications (from August 1992)
Mr. Akira MURAKAMI	: Member / Ministry of Post and Telecommunications
Mr. Takao YAMAZAKI	: Member / JICA

(2) Study Team

Mr. Hideji KAJIKAWA	: Team Leader / Development Plan
Mr. Tatsumi AMANO	: Network Planning (1) / Implementation Plan
Mr. Tadahiko MIURA	: Network Planning (2) / Transmission Plan
Mr. Fujio AIHARA	: Demand Forecast (1)
Mr. Tomio YAMAMOTO	: Demand Forecast (2)
Mr. Ryushi SUENAGA	: Traffic Forecast (1) / switching
Mr. Shizuya MIYAMORI	: Traffic Forecast (2)
Mr. Shoji EZAWA	: Traffic Forecast (3)
Mr. Noboru MIHARA	: Non-telephone / New Service
Mr. Takaaki IIDA	: Cable
Mr. Kenji EGUCHI	: Supporting Facilities
Mr. Haruo ISHIZUKA	: Operation and Maintenance
Mr. Takayasu OTAKE	: Financial and Economic Analysis
Mr. Naoto MATSUDA	: Administrative Support

5.2 Indonesian Side

The persons who closely concerned to the Study are as shown below:

(1) DEPARPOSTEL

Mr. J. L. Parapak	: Secretary General
Mr. Ai Mulyadi	: Director of Planning Bureau
Mrs. Koesmarihati Sugondo	: Head of Program and Evaluation, Planning Bureau
Mr. Budi Santoso	: Planning Bureau

(2) POSTEL

Mr. Daeng Iskandar	: Deputy Director General of Posts and Telecommunications
Mr. Suwito Tjokro	: Director of Planning
Mr. Soedarpo	: Deputy Director of Planning
Mr. Shigemaro Aoki	: JICA Expert

(3) PT. TELKOM (Full-time Counterparts)

Mr. Achadiat	: Deputy Director of Planning, Research and Development Center
Mr. Mulyono Dj.	: Planning, Research and Development Center
Mr. Muntoyo H.	: - Ditto -
Mr. Jajat Suprijatna	: - Ditto -
Mr. Utang Supriatna	: - Ditto -
Mr. Asmudibjo	: - Ditto -
Mr. Fatkhur Rokhman	: - Ditto -
Mr. Era Kamali	: - Ditto -
Mr. Ruwanto	: - Ditto -
Mr. Zainur Rachman	: - Ditto -
Mr. Lemba Ginting	: - Ditto -
Mr. Agus Trio	: - Ditto -
Mr. Sanny Taufik	: - Ditto -
Mr. Jaja Wachja	: - Ditto -
Mr. Hatta Yusuf	: - Ditto -
Mr. IG Putu Raka	: - Ditto -
Mr. Agoes Islandi	: - Ditto -
Mr. Undang Sutarja	: - Ditto -

(4) BAPPENAS

Mr. Eddy Satriya	: Transportation, Communications and Tourism Bureau

The full-time counterparts officials above greatly contributed to the satisfactory completion of the field survey and study work. Some valuable suggestions and useful data were also provided by other members of Indonesian side.

Jica Study Team had studied together with the full-time counterparts in Indonesia from March throughout August, 1992 aiming at technology transfer for overall planning methodology, etc.

One (1) counterpart staff was dispatched to Japan to receive a training course conducted by JICA as the technology transfer for preparation of Implementation Program in the Study. The name of the counterpart and the periods of training were as follows:

Name of Counterpart	Period
Mr. Jajat Suprijatna	1st - 28th Oct. 1992

Besides the training course above, JICA Study Team carried out the classroom training on traffic forecast and circuit calculation for the purpose of the technology transfer to PT. TELKOM's counterparts at PUSRENLITBANG, Bandung, using the planning tools used for traffic estimations and circuit calculation in the Study. The name of the counterparts concerned are as follows:

Name of Counterparts	Period
Mr. Utang Supriatna	12th - 20th Aug. 1992
Mr. Asmudibjo	
Mr. Undang Sutarja	
Mr. Jajat Suprijatna	
Mr. Era Kamali	

6. Schedule of the Study

The schedule and the major items of the Study appears in Table 1-1-1.

Table 1-1-1 Schedule of Study (1/2)

Item	Year / Month	1992 3	4	5	6	7	8	9	10	11
1. Preparatory Work in Japan										
2. Main Work in Indonesia (1)		IC/R								
2.1. Explanation of Inception Report (IC/R)										
2.2. Collection and Analysis of Data and Information										
2.3. Field Survey										
2.4. Demand Forecast										
2.5. Establishment of Development Target					IT/R					
2.6. Preparation of Interim Report (IT/R)										
2.7. Explanation and Discussion on Interim Report										
2.8. Demand and Supply Distribution										
2.9. Traffic Forecast										
2.10. Formulation of Telecommunications Network Plan										
2.11. Preparation of Installation Plan										
2.12. Operation and Maintenance Plan (Draft)										
2.13. Analysis of Financial and Economic Data							P/R			
2.14. Preparations of Progress Report (P/R)										
2.15. Explanation and Discussion on Progress Report										

Legend :

- Preliminary Work in Japan;
- Work in Indonesia (before Interim Report)
- Work in Indonesia (after Interim Report)

Table 1-1-1 Schedule of Study (2/2)

Item	Year	1992				1993		
	Month	9	10	11	12	1	2	3
3. Main Work in Japan (1)								
3. 1. Preparation of O/M Plan								
3. 2. Estimation of Installation Cost								
3. 3. Project Formation								
3. 4. Preparation of Project List								
3. 5. Preparation of Implementation Schedule								
3. 6. Preparation of Project Digest								
3. 7. Financial and Economic Analysis								
3. 8. Fund Raising Plan				DF/R				
3. 9. Preparation of Draft Final Report (DF/R)								
4. Main Work in Indonesia (2)								
4. 1. Explanation and Discussion on DF/R								
5. Main Work in Japan (2)							F/R	
5. 1. Finalization of Study Report								

Legend :

- Work in Japan
- Work in Indonesia

SECTION 2

LONG-TERM DEVELOPMENT POLICY AND STRATEGY

SECTION 2 LONG-TERM DEVELOPMENT POLICY AND STRATEGY

1. Socio-Economic Environment Surrounding Telecommunications Sector in Indonesia

1.1 World Economy and Telecommunications

Recent technological development in telecommunications, transportation, data processing, and production process allows us the worldwide socio-economic activities. International economic relationships have become complex and tightly connected.

Sophistication and increased speed in transportation and distribution system, development of telecommunications and data processing technology, and development and diffusion of telecommunications network and computers have changed advantages of economic entities and market structures. Ubiquity of input material/goods and information, and accessibility to market have increased. Spatial limitation in market segmentation is being decreased to the global market. As financial transactions are made through worldwide electronic network, fluidity of capital has spread all over the world. Locational limitation by input availability, market access, and capital acquisition is decreased significantly.

In this circumstance a volume of information transaction in economic entities, especially in industrial and service sectors, has increased significantly. To support these transaction requirement, not only enhancement of conventional telecommunications means by increasing voice telephony but also introduction of new type telecommunications means including data communication and facsimile, and usage of data and information processing equipment are essential. Telecommunications network is indispensable infrastructure for this activities.

In this context economic entities are able to operate any part of the World if adequate infrastructure enabling the above conditions is furnished. Large scale enterprises are pursuing relative advantages of locations all over the world for their maximum operations and profits. Countries are facing fierce competition to attract economic entities for their economic health and development. For this competition, nations are required to enhance their infrastructure and institutions to guarantee the smooth economic operations, and human resources which are relatively cohesive to the home country.

1.2 Indonesian Economy and Telecommunications

From 1982 to 1985 international demand and price of oil

decreased significantly. This environmental change hit Indonesian economy which was so heavily dependent on the oil revenue. GDP annual growth ratio felt significantly in 1982 and fluctuated in very wide range until 1985.

Since 1983, the Government shifted their policy toward reduction of reliance on oil to avoid uncertainty in oil sector revenue and export oriented industrialization. The Government has taken broad measures including

a) prudent fiscal policies such as tax reform and investment expenditure control;
b) devaluation of Rupiah in 1983 and 1986 and other appropriate exchange rate management;
c) supportive monetary and financial sector policies; and
d) structural reforms associating trade and foreign investment deregulations.

These measures have been effective and resulted in increased growth rate pulled by industrial sector's rapid growth in late 1980s to 1991. The oil sector's share in GDP declined from 24.6% in 1981 to 18.6% in 1991 while industrial sector without oil related industries increased form 11.0% in 1981 to 19.9% in 1991. At the same time the share of the agricultural sector declined from 24.2% in 1981 to 18.3% in 1991. Trend to industrial economy has been obvious. (refer to in ANNEX 3, Figure 1-2-1 and Figure 1-2-2)

Recent rapid growth is fueled by foreign and domestic investment in industrial sector. Amount of foreign investment increased dramatically from 1988 and approximately two third of it is in secondary sector. The Government has recognized importance of foreign investment in economic development and been reducing restriction on it for attraction.

This rapid economic growth, however, caused problem currently. Shortage of infrastructure including telecommunications network, road, port and airport, and power supply became obvious. Quality and quantity of present telecommunications services are viewed as constraints of further economic development including attraction of foreign investment in the worldwide competition among the nations.

1.3 Social Needs of Indonesia and Telecommunications

At the same time, Indonesia is yet to solve equity in development. Equitable income distribution is one of the main development themes of Indonesia. For achievement of the equity two aspects are to be observed. One is regional and the other is personal.

Provision of infrastructure in equitable manner is one way to contribute to that purpose. Without adequate infrastructure and use of them, economic development is difficult to be achieved. Equity in spatial context and in availability in terms of both monetary and quantity for the people in Indonesia is to be considered as the objective.

People or groups of people having telecommunications services are able to obtain broader business chances than ones without the services. Even in rural area societies are not able to be independent from national and worldwide socio-economic activities. Telecommunications network enlarges rural people's ability to contact with outside world. These communications increase possibility of optimal utilization of indigenous resources for their socio-economic development.

Telecommunications has become important means of business communication in all industrial sector. As market economy develops, even in primary sector, direct communication between producers and marketers or consumers is becoming essential. Business transactions through telecommunications network are increasing and becoming indispensable. Economic development requires telecommunications network services.

For social development diffusion of new ideas is required. Telecommunications services assist personal communication which plays integral part in the process of diffusion of new ideas. Also telecommunications services facilitate governmental administrative services in efficiency and quality. Telecommunications network effectively supports overall socio-economic development.

1.4 Requirement to the Telecommunications Sector in Indonesia

For further development of Indonesian economy and society, the telecommunications sector in Indonesia is required to achieve following objectives:

a) to provide telecommunications services at an adequate level of telephone density in commensurate with the needs of a rapidly growing economy;
b) to expand availability of basic telecommunications services in the rural areas;
c) to increase public call offices for increase of telephone accessibility to the public;
d) to improve quality of telecommunications services for assurance of efficiency of communications; and
e) to provide advanced services to enhance competitiveness and productivity of all kinds of activities in Indonesia.

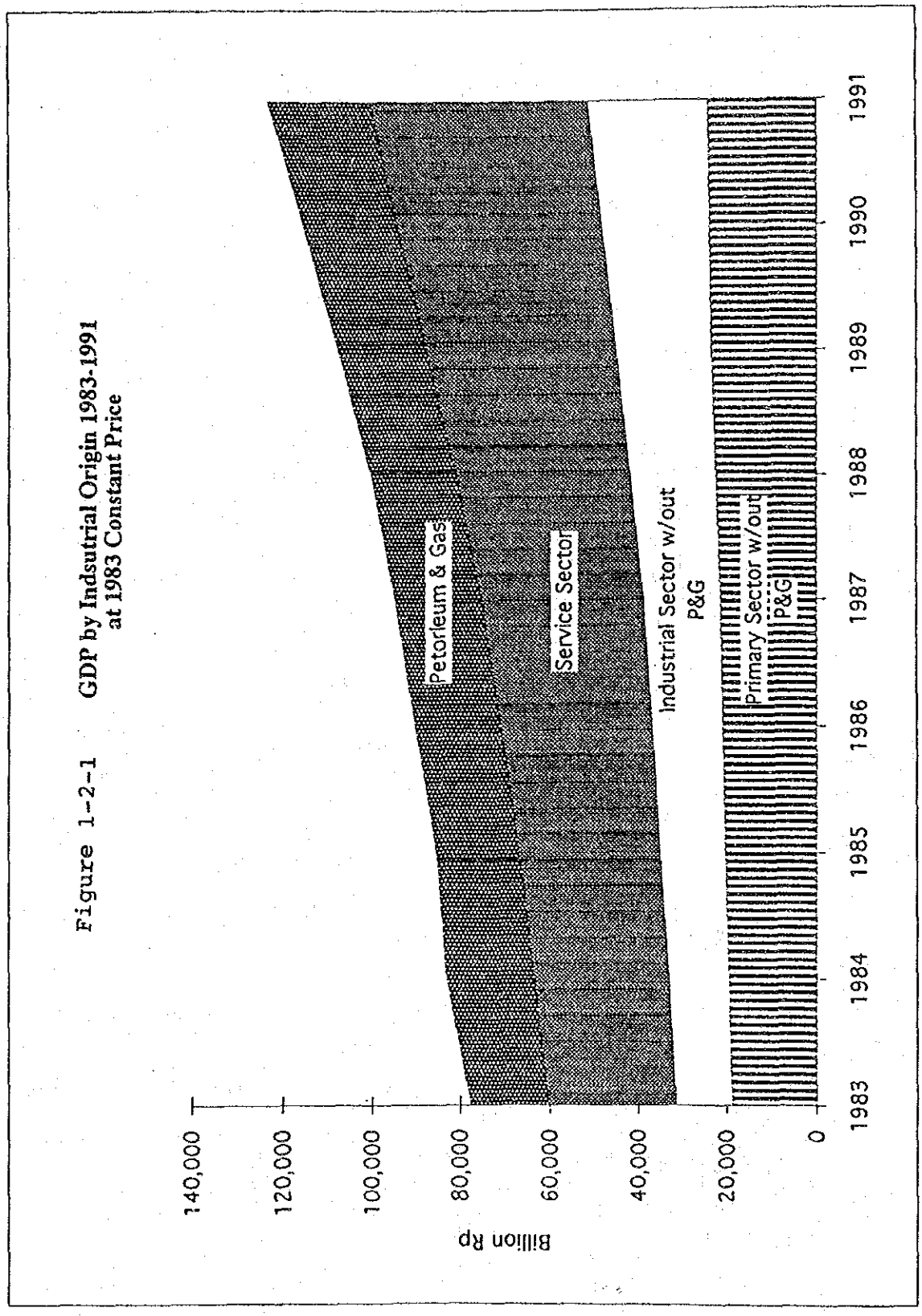
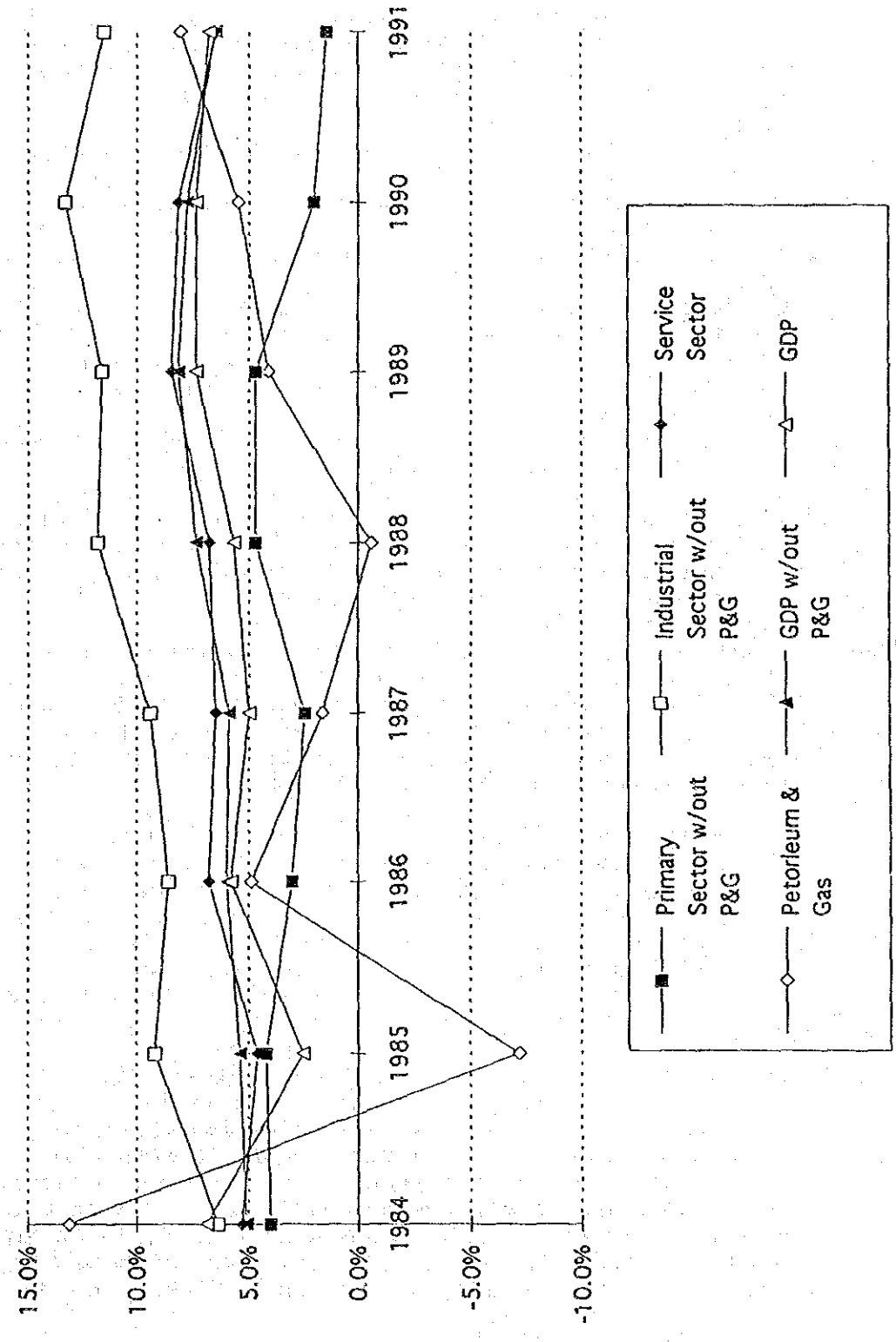


Figure 1-2-1 GDP by Indsutrial Origin 1983-1991 at 1983 Constant Price

Figure 1-2-2 Real Growth Ratio of GDP by Industiral Sector 1984-1991



2. TENDENCY OF TELECOMMUNICATIONS SECTOR

2.1 Worldwide Trends on Telecommunications

The increasing importance of telecommunications for socio-economic development is recognized throughout the world. In addition, telecommunications technologies have changed rapidly over the last fifteen years in both hardware and software as well as service categories.

Under the circumstances, many developed and developing countries have taken major initiatives to restructure their telecommunications sectors over the last ten years aiming to enhance those productivity and competitiveness, and to be free from regulation.

The above-mentioned restructuring of the sector in many countries has involved the following:

(1) increased commercialization of the main service provider;

(2) increased competition; and

(3) various degrees of privatization coupled with regulation to promote competition, minimize monopoly abuses and to secure social objectives for service availability and performance.

2.1.1 Corporatization of Main Service Provider

The telecommunications main service providers are tending to be privatized in the world as a part of sector's restructuring. The current conditions of main service providers privatized are:

Europe	: U.K
North America	: U.S.A, Canada
Middle&South America	: Chili, Jamaica, Guatemala, Argentina, Mexico, Venezuela
Africa	: Nigeria
Asia, Oceania	: Japan, New Zealand, Malaysia, Sri Lanka, India, Australia
Middle East	: Jordan

2.1.2 Competitive Provision on Telecommunications

As a part of deregulation on telecommunications, competitive provision in telecommunications services and terminals has been introduced in the many countries aiming to reach high levels of responsiveness to customer's needs, to charge minimum fee and to achieve maximum productivity. As a result of introduction of competition in telecommunications, it is expected to provide a stable

environment for investors and to protect users against possible abuses as well to improve services and prices for customers.

(1) Competition in Provision of Services

The following services have been provided by many operating companies under the competitive circumstance:

a) value-added and information services;
b) mobile telephone service; and
c) radio paging service.

(2) Competition in Provision of Terminals

As a world-wide trend of the times, the following terminal equipments have been provided under the competitive conditions in order to promote diversity of supply:

a) telephone sets including portable telephone;
b) telex terminals;
c) facsimile terminals; and
d) PABX.

2.2 Restructuring of the Sector in Indonesia

Taking the World Bank's proposal made in 1990 into consideration, the Indonesian government has entrusted the Consultant to study the following items on restructuring of telecommunications sector:

(1) developing a strengthened policy, regulatory and supervisory capability within MTPT;

(2) establishing consultation mechanisms that provide the government with the view of users as well as those of service providers;

(3) promoting competition and private sector participation;

(4) developing appropriate strategies for investment, procurement and financing; and

(5) institutional strengthening of operating companies.

2.3 Restructuring of PT. TELKOM

The previous PERUMTEL (Public Telecommunications Corporation) changed to PT. TELKOM (State-Owned Limited Liabilities Company) on September 24, 1991.

Reform of newly born PT. TELKOM has been proceeding since its inauguration aiming to realize corporatization. Through the change of corporate culture, i.e., delegation, decentralization, de-bureaucratization, deregulation, PT. TELKOM has been reforming itself into a company with more market-oriented philosophy and higher operating efficiency in order to cope with the rapid changes of its environments.

3. DEVELOPMENT POLICY AND STRATEGY

3.1 Development Policy

The long term policy for telecommunications development during the Second Long-Term Development Phase (1994 - 2019) is to satisfy all the demands of people for telecommunications services by the end of the Phase, both in quality as well as in quantity under the fully enhanced network ensuring to support the development of Indonesian national socio-economy.

The program of the above long-term telecommunications development for the new era is designed in the following three development stages:

(1) First Stage : Acceleration Decade (1990 - 1999)

The first stage is set as the decade of development acceleration. Within the decade, the level of Indonesian telecommunications is to be reached at the internationally adequate level of telephone density in commensurate with its economic level.

(2) Second Stage : Enhancement Decade (2000 - 2009)

The second stage is set as the decade of stable development to strengthen the basis of telecommunications sector in Indonesia in order to assure a self-reliance in the next stage.

(3) Third Stage : Autonomy Decade (2010 - 2019)

The last stage is set as a decade of autonomy. Telecommunications sector, which becomes self-reliant both in supply of facilities and finance for development, realizes an information network, which can be utilized by everyone, from everywhere and at every time, to serve the Indonesian people with home communications.

The final aim of the long-term policy on telecommunications development by the year 2019 is established into four (4) categories, such as services, facilities, human resources and finance.

3.1.1 Services

The long-term targets on services development are set in four (4) sub-categories such as volume, penetration, quality and diversification as follows:

(1) Telephone Density

To realize immediate installation of telephone after application (telephone density reaches 10 or more per 100 inhabitants).

(2) Service Penetration

To serve over whole Indonesia including rural areas with telephone services.

(3) Service Quality

To achieve SCR (Successful Call Ratio) of 70%, which is recommended by CCITT as a high target, under the automatized telephone service.

(4) Service Diversification

To provide PCN (Personal Communication Network) under Broadband ISDN.

3.1.2 Facilities

To develop the complete B-ISDN by introduction of ATM (Asynchronous Transfer Mode) aiming at realizing real IN (Intelligent Network) in the next long-term phase.

3.1.3 Human Resources

To strengthen its competitive position as a corporation after the corporatization of PT. TELKOM, and to form its organization being able to cope with rapid technological evolution and increase of demands for telecommunications services.

3.1.4 Finance

To increase a rate of own fund in the investment and to realize autonomy.

3.2 Development Strategy

The development strategy in accordance with the long-term policy is mentioned below by development category.

3.2.1 Services

The strategic targets on services by each decade are established as follows:

Acceleration Decade : To catch up with an adequate level of telephone density.

Enhancement Decade : To spread the telephone service up to the rural area.

Autonomy Decade : To realize PCN including video communications.

For achieving the above-mentioned strategic targets, the following approaches by sub-category are to be taken:

(1) Telephone Density

a) To increase the main telephone lines with 2.6-3.2/100 inhabitants. (Acceleration Decade)
b) To expand the main telephone lines with approximately 5.5/100 inhabitants. (Enhancement Decade)
c) To keep a stable development as a sound company. (Autonomy Decade)

(2) Service Penetration

To extend telephone service up to rural areas by effective application of digital subscriber transmission system and remote switching unit.

Aiming at improvement of service accessibility, in addition, to install public pay telephones in rural areas positively.

(3) Service Quality

To improve the SCR by taking adequate means such as:

a) Improvement of subscriber's behavior through nation-wide campaign;
b) Improvement of availability by strengthening of maintainability; and
c) Provision of adequate facility capacities.

(4) Service Diversification

a) Provision of basic ISDN services under N-ISDN During Acceleration Decade;
b) Integration of various narrow-band services and introduction of broad-band services under B-ISDN during Enhancement Decade; and

c) Realization of PCN (Personal Communication Network) by development of B-ISDN services and utilization of domestic satellite during Autonomy Decade.

3.2.2 Facilities

Telecommunications network as well as facilities concerned are to be enhanced and to be expanded by the following strategic approaches:

Acceleration Decade : Extension of IDN (Integrated Digital Network) and structuring of N-ISDN.

Enhancement Decade : Introduction of and B-ISDN.

Autonomy Decade : Development of B-ISDN and introduction of L-band satellite.

To assure the above steps, the following are to be taken into consideration:

(1) To complete IDN prior to commencement of N-ISDN services;

(2) To digitalize MTS (Mobile Telephone System) and satellite systems;

(3) To standardize both of switching and transmission systems for rural telecommunications system;

(4) To establish criteria for selection of switching system on area and exchange basis; and

(5) To encourage the installation of fiber optic subscriber cables.

In addition, the following measures are to be considered to provide the facilities at the adequate time:

(6) To secure the procurement of facilities on schedule based on the development program by establishing overall procurement system; and

(7) To reduce the project implementation period by the coordination among planning, procurement and implementation.

3.2.3 Human Resources

Aiming at realizing of corporatization and autonomy in the telecommunications sector, the following strategic targets are set:

Acceleration Decade : To form the market-oriented and effective organization.

Enhancement Decade : To enhance competitiveness and effectiveness for the corporatization.

Autonomy Decade : To enlarge capability both in technology and services as a leading company.

For the above targets, the following measures are considered to be taken:

(1) Forming of the effective organization

Strengthening and establishing necessary departments and sections both in headquarters and regions accompanied by clear work demarcation and suitable delegation of authority.

(2) Human resources development

Aiming at enhancing effectiveness and competitiveness of PT. TELKOM, human resources are to be developed through the following measures;

a) permeation of the corporate culture as a main service provider and a leading company in Indonesian telecommunications sector;
b) recruiting highly educated personnel and enhancement of training systems to fulfill the required number of engineers and managers; and
c) improvement of the stability of work force by developing appropriate systems for welfare, assessment and remuneration.

Meanwhile, the various types of computerized management systems are to be introduced and continuously utilized. In addition, aiming at further enhancement of capability on technology and services, cooperation with other private sector and governmental laboratory is encouraged.

3.2.4 Finance

Aiming at realizing autonomy of the entity, the strategic targets on finance are set as follows:

Acceleration Decade : To foster the financial foundation.

Enhancement Decade : To strengthen the soundness as corporation.

Autonomy Decade : To maintain the sound company.

To achieve the above targets, an emphasis is put on an increase in revenue and decrease in expenditure.

(1) For revenue increase:

a) to raise rate of tariff;
b) to enhance marketing capability;
c) to improve quality of service; and
d) to improve fees and charges collection system.

(2) For cost decrease:

a) to improve staff efficiency per 1,000 subscribers; and
b) to streamline general and administrative operations.

3.3 Development Targets

In accordance with the long-term development policy and strategy, the long-term development targets up to the year 2009 are summarized in Table 1-2-1.

Table 1-2-1 Development Targets up to 2009

Category	1991	1993/94	1998/99	2003/04	2008/09
Services					
1) Tel. Density	0.7	1.3	2.6/3.2	3.6	5.5
2) Penetration	major IKK	IKK	IKC	major Desa	Desa
3) Quality (SCR)	18%	25%	45~50%	50-70%	70%
4) N-ISDN	-	JKT,SBY BDG	JKT,SBY BDG,MDN	major IKP	major IKK
5) B-ISDN	-	-	-	-	6 major cities
Facilities					
1) Digitalization	60%	70%	90%	100%	100%
2) IDN	-	-	IKP and major cities	IKK & IKC	
3) Introduction of New Technology	Submarine Fiber Cable	Cellular MTS	Digital MTS SDH	Digital SAT	ATM
Human Resources					
1) Staff/k DEL	32	18	10	9	8
2) Technician : Non-technician	45:55	47:53	55:45	56:44	60:40
3) University : Academy : Junior/High School	4: 5:90	8:12:80	20:18:62	27:31:42	36:38:26
4) Organization	Corporati-zation 1HQ & 12 WITEL	Corporati-zation (Corporation Separation)			Corporati-zation
Finance					
1) Internal Fund	25%	25%	30%	50%	70%
2) Operating Ratio	80%	80%	75%	70%	70%
3) Debt Service Coverage	2.3	2.3	2.5	3.0	4.0

SECTION 3
TARGETS OF REPELITA-VI PROGRAM

SECTION 3 TARGETS OF REPELITA-VI PROGRAM

1. SUMMARY OF THE TARGETS

The important development policy for REPELITA-VI is "to fulfill the rapidly increasing demand and heighten the telephone density".

As a result of implementation of REPELITA-VI, it is expected that the telephone density will reach to an adequate level commensurate with the Indonesian economic level. Furthermore, it will accelerate the economic growth in Indonesia. On the basis of such policy, the following overall targets are to be achieved during REPELITA-VI:

(1) To accomplish the following targets in telephone line unit capacity at the end of REPELITA-VI, which is 5.0 MLU to be newly installed, as well as the relevant other sub-systems:

Table 1-3-1 Development Targets for Telephone Service

3.0 MLU: at the end of PELITA-V
3.5 MLU: basic component during REPELITA-VI 1.5 MLU: additional component during REPELITA-VI ↓ 8.0 MLU: total at the end of REPELITA-VI

Note: MLU: Million Line Units

3.5 MLU as basic component is to reach international average commensurate with 7% of GDP growth. 1.5 MLU as an additional component is to accelerate economic growth more than the above. In the study, those components are considered as follows:

* 3.5 MLU: exchange by exchange basis study
* 1.5 MLU: profitable area by area basis study

(2) To provide automatic telephone service up to all the Kecamatan;

(3) To establish IDN (Integrated Digital Network) between major cities including the provincial capitals;

(4) To improve telephone service quality, i.e., SCR (Successful Call Ratio) up to the range of 45% - 50%;

(5) To improve the network security by diversification and duplication of transmission routes; and

(6) To provide N-ISDN services in major four (4) cities i.e. Jakarta, Surabaya, Bandung and Medan.

Details of categorized targets are described below.

2. SERVICES

2.1 Plain Ordinary Telephone Services (POTS)

2.1.1 Telephone Density

(1) Telephone Density realized by Basic Component

3.5 MLU as basic component is to reach international average commensurate with economic growth. The total capacity by the end of REPELITA-VI becomes 6.5 MLU. By the basic component, 2.8 million subscribers are to be newly connected and 2.6 main lines per 100 inhabitants is expected at the end of REPELITA-VI.

(2) Telephone Density realized by basic and additional Components

In addition to the basic component, 1.5 MLU as a additional component is to accelerate economic growth. In consequence of 1.5 MLU installation, 4.0 million subscribers will be newly connected by the end of REPELITA-VI. The telephone density will reach to 3.2 per 100 inhabitants.

2.1.2 Service Penetration

Service penetration should be expanded to all the Kecamatan, while installation of public pay telephones and establishment of telecommunications service centers (WARTEL) in rural areas are encouraged to improve service accessibility.

2.1.3 Service Quality

(1) Quality on Call Connection

The target of SCR to be achieved is the range of 45% - 50% at the end of REPELITA-VI by taking the following measures:

a) overall Indonesia

- implementation program harmonized facility-wise with others concerned;
- increase of sufficient number of toll and junction circuits;
- diversification and duplication of network; and
- IMS (information management system).

b) TC/SC and Multi-Exchange areas

- replacement of analog switching system;
- expansion of junction facility and associated facilities; and
- rehabilitation of local cable network including replacement of deteriorated cable facilities.

Meanwhile, the following measures for improvement of SCR are to be continuously taken:

c) improvement of undesirable subscriber's behavior, such as reduction of partial and mis-dialling;

d) positive utilization of announcement machine in the cases of traffic congestion, failure of facilities, etc.;

e) encouragement of introduction of hunting system to large scaled companies and governmental offices; and

f) reduction of load for low BHCA switching system.

(2) Quality on Communication

Replacement of deteriorated subscriber's cable is carried out to reduce undesirable conditions for communication such as noise and crosstalk. On the other hand, installation of fiber optic subscriber cable for large cluster of users such as multi-story building, is considered aiming to enhance the quality on communication and to bring effective use of the existing civil facilities.

2.2 Mobile Communication Services

2.2.1 Mobile Telephone Service

Cellular mobile telephone system (900MHz Band) is expanded and provided to the major provincial capitals covering the highway connecting those capitals. Digital system is basically to be applied for the new service areas.

2.2.2 Radio Paging Service

Radio paging service is to be operated in most of the provincial capitals, while the existing service areas are to be expanded and integrated. For effective use of radio paging service, the number of public pay telephones is to be increased as well as telecommunications service centers (WARTEL).

2.2.3 Advanced Mobile Services

The introduction of wide range mobile communications services involving trains and vessels would be considered.

2.3 ISDN Services

Narrow-band ISDN services are to be operated during the period. The particulars are described below.

2.3.1 Service Areas

N-ISDN services are planned to be provided in Jakarta, Surabaya, Bandung and Medan during REPELITA-VI.

2.3.2 Service Menu

(1) Bearer Services

a) 2B+D services for small business users;
b) 30B+D services for large scale business and governmental users equipped with ISDN PBX; and
c) other bearer services could be provided on demand basis.

(2) Tele-Services

a) Teletex;
b) G4 facsimile;
c) MHS (message handling service); and
d) Toll-free dial services.

(3) Supplementary services

a) Call Offering Supplementary Services (especially, call transfer service);
b) Call completion supplementary services (especially, call waiting service); and
c) Charging supplementary services.

3. FACILITIES

3.1 Switching Facilities

To connect new 2.8 million subscribers, digital local switching equipment of 3.5 million L.U. (Line Units) are to be installed as well as the related digital trunk switching facilities. The installation plan is made on exchange by exchange basis. In addition, 1.5 million line unit capacity of switching facilities is installed. The installation plan is prepared on more profitable area by area basis.

In addition, ISDN switching equipment with CCS No. 7 are to be introduced in JKT, SBY, BDG and MDN.

3.2 Outside Plant

Primary cables of approximately 5.0 million pairs for 3.5 million line units and approximately 2.0 million pairs for 1.5 million line units are to be expanded for new subscriber connections as well as for rehabilitation purposes, while introduction of fiber optic subscriber cable can be considered for the large cluster of users.

3.3 Transmission Facilities

(1) Backbone Link

The major backbone terrestrial transmission links are to be diversified along with back-up circuits of satellite system aiming at improvement of network security. The system applicable to SDH (Synchronous Digital Hierarchy) is adopted to new routes of major backbone terrestrial links. The backbone transmission system and the junction network for the areas to be distributed 1.5 million line units covers the capacities of additional 5.0 million line units.

(2) Spur Link

The digital spur transmission links are expanded up to major IKK as a preparation for completion of IDN in the next Development Decade.

(3) Subscriber Link

The installation of subscriber transmission system is to be encouraged to cover all IKC with telephone services.

(4) Satellite transmission Link

Satellite transmission link is to be installed for both back-up transmission system and backbone transmission route and spur route where terrestrial transmission link is not available.

(5) Leased Circuits

Leased circuits are provided for both voice and non-voice transmission in the area and between areas.

3.4 Other Facilities

In addition to the above, the following facilities are to be expanded:

(1) Expansion of public pay telephones including card telephone boxes.

(2) Establishment of telephone service centers (WARTEL) in major IKC.

4. HUMAN RESOURCES

4.1 Organization

The following departments and sections are to be strengthened both in the headquarters and the regions accompanied by clear work demarcation and authority, considering separation of corporation:

a) Planning;
b) Implementation/construction;
c) Operation & Maintenance;
d) Research and Development; and
e) Strategic Marketing and Customer Service.

4.2 Number of Staff

The number of staff per 1,000 main telephone lines is to be 10 at the end of REPELITA-VI reducing from the present 32 personnel.

Taking the expected number of main telephone lines into consideration, approximately 52,600 staff and 62,300 staff for 3.5 MLU Plan and 5.0 MLU Plan respectively will be required at the end of the REPELITA-VI. In consequence, about 16,000 staff and 25,700 staff, respectively are estimated to be recruited during REPELITA-VI provided that about 3% of total staffs will retire each year. The composition of employees is presumed as below along with new employees by the end of REPELITA-VI:

Table 1-3-2 The Number of Staff Required by the End of REPELITA-VI (3.5MLU basis)

Items	Total Staff Required	New Employees Required
<Specific Field>		
Technique	28,930 (34,250)	11,740 (17,060)
Non-technique	23,670 (28,030)	4,280 (8,640)
<Qualification>		
University	10,520 (12,460)	7,590 (9,530)
Academy	9,470 (12,460)	5,080 (8,070)
High/J.H School	32,610 (37,370)	3,350 (8,100)
Total	52,600 (62,280)	16,020 (25,700)

Note: figures in ( ) shows the required numbers for 5.0MLU.

5. FINANCE

5.1 Investment Cost

Investment amount for REPELITA-VI is roughly 7.53 billion US$ in 1992 value calculated by a unit cost of US$ 1,503 obtained through historical contract data. Among them basic component's portion is US$ 6.38 billion. When considering foreign exchange deflation and price inflation, these actual fund requirement expected are approximately 22.28 trillion Rp and 18.57 trillion Rp respectively.

5.2 Fund Procurement and Financial Target

(1) About 3 billion US$ foreign loans are expected to be procured.

(2) The rest of required fund amounting to US$ 4.5 billion equivalent shall be procured and/or generated by PT. TELKOM's own efforts. A half of this is expected to be generated by PT. TELKOM itself.

Since the investment scheme is ambitious for PT. TELKOM, approximately 70 percent of fund must be external or additional to the company. Therefore massive low cost financing including capital increase and low or no interest bond such as telephone user bond is indispensable for profitability assurance. Also favorable interest rate for foreign official loan through the ministry of finance are desirable.

At the same time revenue increase by minimizing idle capacity, maintaining or increasing pulse productivity per line unit, and tariff raising are required for the same objective.

SECTION 4

CURRENT STATUS OF TELECOMMUNICATIONS

SECTION 4 CURRENT STATUS OF TELECOMMUNICATIONS

1. CIRCUMSTANCES SURROUNDING PT. TELKOM

The worldwide wave of corporatization and private participation comes into telecommunications sector. Meanwhile, the recent rapid development for socio-economic activities accelerates the physical infrastructure services' reforms, particularly in power and telecommunications. The telecommunications sector in Indonesia has been reformed in the 1990s.

In 1989, new telecommunications laws modified PERUMTEL's domestic monopoly to allow provision of non-basic services by other public and private entities.

In 1991, PERUMTEL, the corporate status changed to a limited liability company along the lines of PT.INDOSAT. At the same time, PERUMTEL was renamed to P.T. Telekomunikasi Indonesia (PT. TELKOM) as initial step towards corporatization.

In 1992, the first revenue-sharing arrangement (PBH-1) completed their construction and handed-over 100,000 new telephone line units in Jakarta to PT. TELKOM by five private companies. This contract was approved by the Government in 1990 to upgrade and accelerate development of basic telephone services by expanding private sector participation. The second, third and regional revenue-sharing schemes (PBH-2, PBH-3 and PBH small) are followed and would be realized in near future.

As non-basic services, the service field of Radio paging, Data communication by VSAT and Packet Data communication are opened for competitive provision by private sector.

For the growth of the domestic telecommunications manufacturing company, the Government awarded PT. INTI in cooperation with Siemens GmBh as the first digital switching equipment manufacturer in 1985 and manufacturing capability now reached to 400,000 line units per year. PT.INTI also manufactures or assembles telephone instruments, radio and multiplex equipment, satellite earth stations.

In 1991, to meet the increasing large demand of switching equipment the Government awarded the competitive second and third digital switching equipment manufacturers. They are PT. CITRA TELEKOMUNIKASI INDONESIA with AT&T Network System Nederlands B.V. and PT. ELEKTRINDO NUSANTARA with NEC.

For cable manufacturing, there are five big companies.

Their total production capacity seems to meet the demand in Indonesia.

1.1 Newly Born PT. TELKOM

PT. TELKOM was newly born as a state-owned limited liability company on 24 September, 1991 according to an enforcement of P.P. No. 25/1991, changing its corporate status from the previous PERUMTEL.

Under the slogan of 4 "D", namely Delegation, Decentralization, De-bureaucratization and Deregulation, PT. TELKOM has been strengthening its foundation as a private company since its inauguration. As a part of strengthening, ad-hoc engineering group has been established to cope with a rapid technical evolution and it was changed to the Directorate of Engineering in April, 1992.

Level-up of salary, which took place before corporatization to the state-owned company, made recruiting easier and improved the stability of work force.

On the other hand, a shortage of human resources became serious due to the rapid decentralization, in addition, disharmony between work demarcation and delegation of authority affected smooth prosecution of affairs specially for implementation.

The latest organization chart for PT. TELKOM is shown in Figure 1-4-1, while Figure 1-4-2 is the Organization Chart of WITEL.

Figure 1-4-1 Organization Chart of PT. Telkom

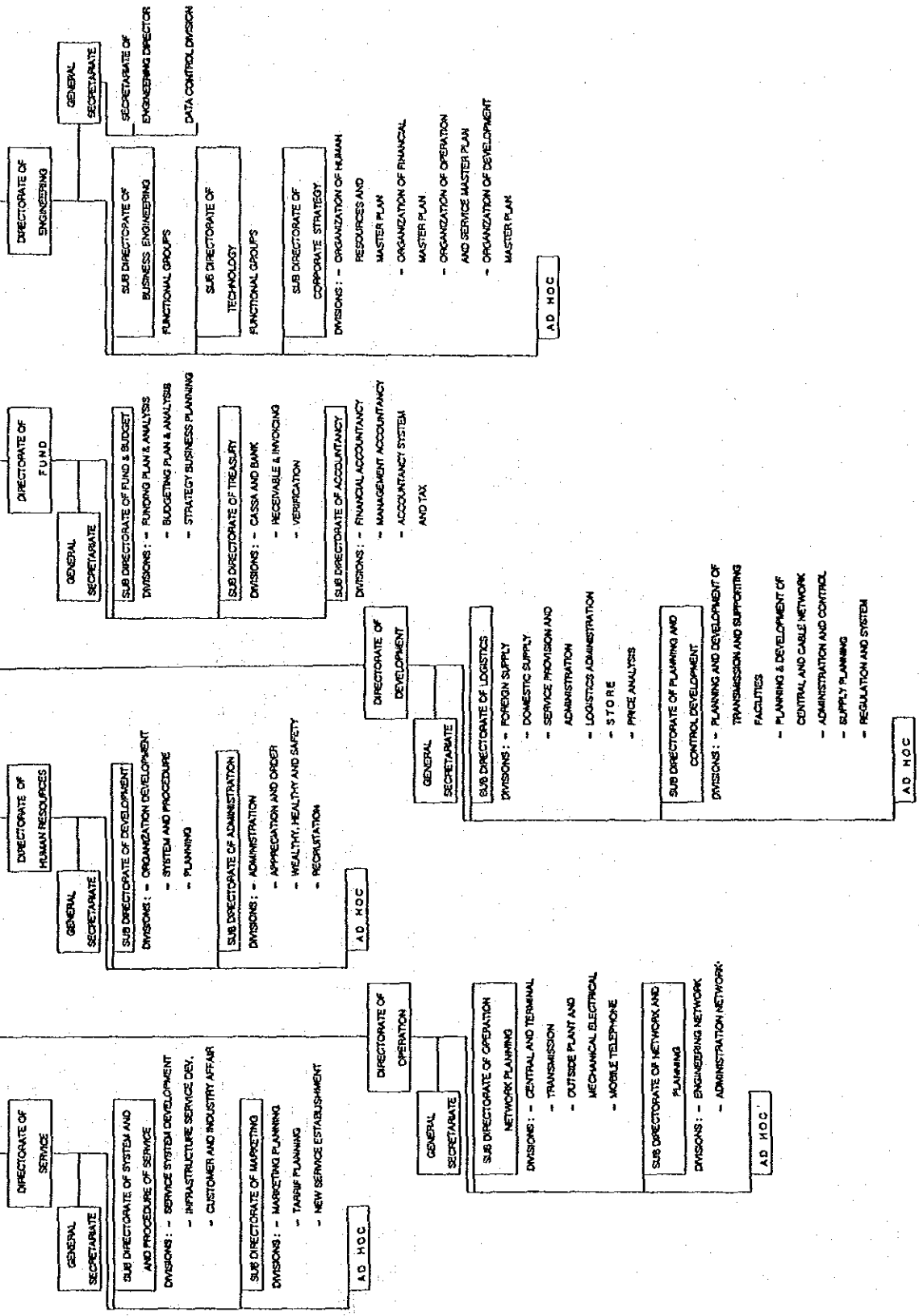


Figure 1-4-2 Organization Chart of WITEL

1.2 Private Sector Participation

Previous PERUMTEL and PT. INDOSAT have provided domestic and international telecommunications services, respectively. In accordance with an enforcement of the Law No.3/1989, however, private sector was allowed to participate in operating of non-basic telecommunications services. The private companies have operated the following services under the agreement on revenue sharing with PT. TELKOM:

(1) Mobile Telephone Services

a)	PT. Rajasa Hazanah Perkasa	Jakarta, Bogor Puncak, Cianjur Bandung	STKB-C NMT 30,000 Max
b)	PT. Elektrindo Nusantara	Jakarta and Bandung	AMPS A 25,000
c)	PT. Sentralindo Panca Sakti	Jakarta, Surabaya and Malang	AMPS A 6,000

Note : above b) and c) are operated.

(2) Radio Paging Services

22 companies operate in 24 cities. In addition, 20 companies including 3 national paging companies are granted new licenses by MTPT as paging operation without cooperation by PT. TELKOM.

(3) Packet Data Services operated by Lintasarta

(4) Data Communication Services through VSAT operated by PT. Citra Sari Makmur and PT. Lintasarta.

(5) Private network

a) National Electricity Corporation (PLN);

b) The state oil company (PERTAMINA);

c) The state railway company (PJKA); and

d) Indonesian Armed Forces.

1.3 National Productive Capability

1.3.1 Digital Switching Equipment

(1) PT. INTI in association with Siemens GmBh

They has supplied EWSD switching equipment about 50,000 - 60,000 L.U. per annum until PELITA-IV. The maximum productive capability of PT. INTI was presumed as approximately 100,000 L.U. per annum. The latest supply volume, however, was increased in the period of PELITA-V and became about 400,000 L.U. per annum.

(2) PT. CITRA TELEKOMUNIKASI INDONESIA in association with AT&T Network Systems Nederlands B.V.

(3) PT. ELECTRINDO NUSANTARA & PT. HUMPUSS in association with NEC

1.3.2 Telephone Cable

(1) PT. Supreme Cable Manufacturing Corporation;

(2) PT. Jembo Cable;

(3) PT. Voksel Electric;

(4) PT. Kabelmetal Indonesia;

(5) PT. Kabelindo Murni;

(6) PT. Tranka Kabel; and

(7) PT. Indah Kabel Indonesia.

1.4 National Constructive Capability

The constructive capability of the domestic construction companies especially for local cable network has been enhanced through the following large scale projects:

a) TAHAP-III;
b) TAHAP-IV; and
c) TELECOM-III.

In addition to the above, the capability of construction for subscriber's premises by PT. TELKOM is increased to about four times of the previous one in PELITA-IV. About 200,000 subscribers have been newly connected per annum during the last three years.

1.5 Build, Transfer and Revenue Sharing Arrangement (PBH)

In addition to the conventional provision by PT. TELKOM, the provision by build, transfer and revenue sharing arrangement (PBH- 1 to 3) has been made as follows:

(1) The first revenue sharing arrangement (PBH-1)

a) PT. Wahana Komunikatama (Jakarta)	21,000	L.U.
b) PT. Erakomindo Puranusa (Jakarta)	18,000	"
c) PT. Bakrie Electronics (Jakarta)	21,000	"
d) PT. Elektrindo Nusantara (Jakarta)	20,000	"
e) PT. Wahana Esa Sambadha (Jakarta)	20,000	"

(2) The second revenue sharing arrangement (PBH-2)

a) PT. Telekomindo Prima Nusa Bakti (Jakarta, Surabaya, Bandung)	190,000	L.U.

(3) The third revenue sharing arrangement (PBH-3)

a) PT. Wahana Komunikatama	35,000	L.U.
b) PT. Erakomindo Puranusa	35,000	L.U.
c) PT. Bakrie Electronics	35,000	L.U.
d) PT. Elektrindo Nusantara	35,000	L.U.
e) PT. Wahana Esa Sambadha	35,000	L.U.
f) PT. Telekomindo Prima Bhakti	25,000	L.U.

2. SERVICES

National telecommunications services in Indonesia are categorized as follows:

a) Telephone Service;
b) Non-telephone Services (Telex, Telegram, Data Communications and ISDN);
c) Mobile Communication Services (Mobile Telephone and Radio Paging); and
d) Leased Circuits Service.

2.1 Telephone Service

Table 1-4-1 and Figure 1-4-3 show the telephone service development in Indonesia by PELITA-wise and current condition as of December 1991.

Table 1-4-1 Telephone Service in Indonesia

PELITA Year	I 1973	II 1978	III 1983	IV 1988	V As of 1991
Main Telephones (x1000)	198	275	503	803	1,247
Automatic	107	193	444	708	1,210
Manual	91	82	59	95	37
Public Telephones			2,363	5,736	25,363
Coin-telephones			2,363	5,724	21,679
Card-telephones				12	2,884
WARTEL					800
Population (x1000000)	128.6	140.7	158.1	175.6	182.3
Main Tel/100 persons	0.15	0.20	0.32	0.46	0.68

The First Long Term Development Period (from 1968 to 1993) will be ended by the same time of PELITA-V goal. During the 15 years of PELITA-II through IV, the main telephone lines had increased by approximately 10 percent per year. While, in consecutive three years 1989 through 1991 in PELITA-V, the number of subscribers has remarkably increased by 15.2 percent per year.

The automatic service ratio in terms of the number of main telephone lines has reached 97.0% in 1991.

In addition to the above, during PELITA-IV and V, the service variety has also been broadened as follows:

a) expansion of ISD and SLDD service coverage;
b) provision of many public pay telephones (Coin-telephone, Card-telephone and WARTEL); and
c) commencement of cellular mobile telephone and radio paging services (in limited areas).

These new services are expected to be upgraded and expanded corresponding to development of Indonesian socio-economy.

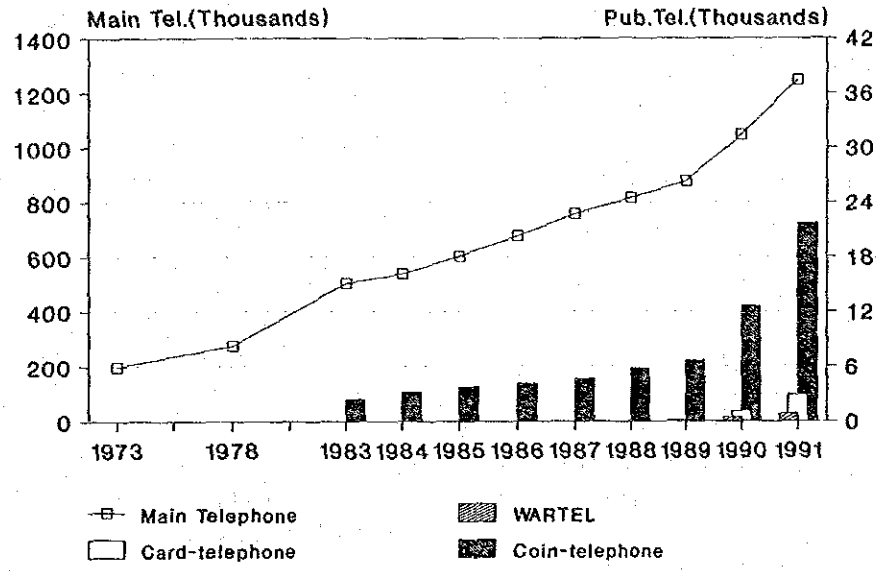


Figure 1-4-3 Telephone Service in Indonesia

In the process of rapid growth of the telecommunications network, on the other hand, the unbalance of provision among systems, such as switching, transmission, cable plant, occurred. As a result, average successful call ratio (SCR) is less than 20 percent.

The telephone service at suburban area is mostly covered by public telephone services such as WARTEL and pay telephones.

International automatic telephone service to 185 countries are available in 92 cities.

2.2 Non-telephone Services

2.2.1 Telex and Telegram Services

Facilities and service productivity for telex and telegram services are shown in Table 1-4-2, while Figure 1-4-4 shows these services development in Indonesia.

Table 1-4-2 Telex and Telegram Services in Indonesia

PELITA	I	II	III	IV	V
Year	1973	1978	1983	1988	As of 1991
Telex Service					
Total Pulses (x1000)	9,925	35,894	336,400	522,484	561,110
No.of Telex Terminals	1,194	2,871	8,570	15,441	19,529
No.of Telex Capacity	1,210	9,230	12,220	17300	27,879
Telegram Service					
Total messages (x1000 messages)	3,776	5,213	7,858	11,668	13,583
GENTEX Terminals(Units)	-	199	544	819	1,111
Leased Circuits (Lines)	96	172	560	1,611	2,266

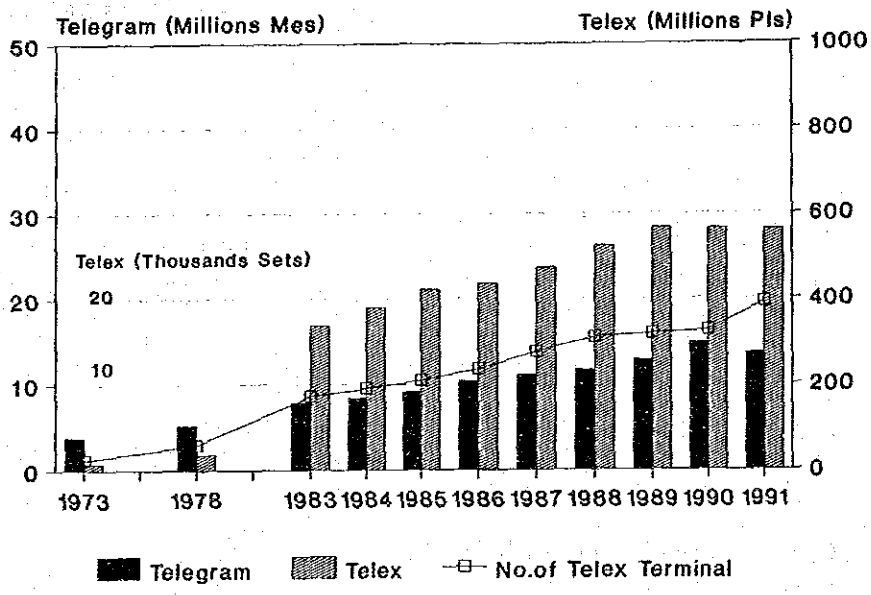


Figure 1-4-4 Telex and Telegram Services in Indonesia

The number of pulses in telex service has increased by 36.1 percent per year during 10 years of PELITA-II and III, 9.2% during next 5 years of PELITA-IV.

In the areas where tele-facsimile service is available, especially in urban area, the number of total pulses has been slightly decreased from 1989.

The increase ratio of the telegram messages was 7.8% during the periods from PELITA-II to PELITA-IV and 5.2% during three years of 1989 through 1991 in PELITA-V.

The telegram service has mainly substituted for telephone service until the telephone service is provided. In consequence of development of the telephone network in the rural areas, in recent years, the use of telegram service has been gradually decreased.

2.2.2 Facsimile Service

The facsimile service is provided by telephone network. Due to the growth of Indonesia economy and the price-down of the facsimile terminals, the service has rapidly permeated in offices. The number of terminals is now estimated more than tens of thousands.

2.2.3 Data Communications Services

Data transmission service has been operated since 1985 by SKDP network and the number of data subscribers connected as of end of 1991 was approximately 600.

Year	1988	1989	1990	1991
a) Dial-up services (SKDP)	223	330	452	519
b) Leased circuits	23	37	62	67

International data transmission service is available with 26 countries through Tele-Pack Network in Singapore and ITT-UDTS Network in USA.

2.2.4 ISDN Services

Corresponding to the growth of Indonesian economy, recently, the demand for new telephone/non-telephone services has been recognized in the country.

Non-telephone services, especially data transmission services are expected to be available through ISDN in near future. Possible users are banks, airway companies, etc.

To realize such new services, PT.TELKOM plans an introduction of ISDN services by the end of PELITA-V. The following services will be introduced among Jakarta, Bandung and Surabaya:

a) Data transmission services;
b) Teletex service;
c) Video conference service by still picture; and
d) G4 facsimile service.

2.3 Mobile Communication Services

2.3.1 Mobile Telephone Service

Land mobile telephone service has started in Jakarta since 1977. As of March 1992, the mobile telephone service is available in Jakarta, Surabaya, Batam, Jakarta-Bandung and Surabaya-Malang.

The system capacity and the number of subscribers are shown in Table 1-4-3 and Figure 1-4-5. The growth rate of last 5 years from 1987 to 1991 was 36.4 percent per year.

Table 1-4-3 Mobile Telephone Service in Indonesia

PELITA Year	I 1973	II 1978	III 1983	IV 1988	V 1991
<Large-zone System> "STKB-INTI"					
No. of Cities (Areas)	-	1	1	3	3
System Capacity	-	-	-	3,024	6,300
No. of Subscribers	-	-	1,750	2,504	5,110
<Cellular System> "STKB-C"					
No. of Cities (Areas)	-	-	-	2	2
System Capacity	-	-	-	10,000	20,000
No. of Subscribers	-	-	-	6,504	15,078
<Cellular System> "STKB-N"					
No. of Cities (Areas)	-	-	-	-	1
System Capacity	-	-	-	-	21,000
No. of Subscribers	-	-	-	-	3,119
Total No. of Subscribers	-	-	1,750	9,008	23,307

Note: figures of PELITA-V are as of 1991.

2.3.2 Radio Paging Service

After the first operation in 1986 in Jakarta area, radio paging service is spreading in the country. The growth rate of the last 5 years from 1987 to 1991 was 45.5 percent per year.

The summary of the paging service is shown in Table 1-4-4 and Figure 1-4-5.

Table 1-4-4 Radio Paging Service in Indonesia

PELITA Year	I 1973	II 1978	III 1983	IV 1988	V As of 1991
City (Area)	-	-	-	12	24
Subscribers	-	-	-	22,478	78,235

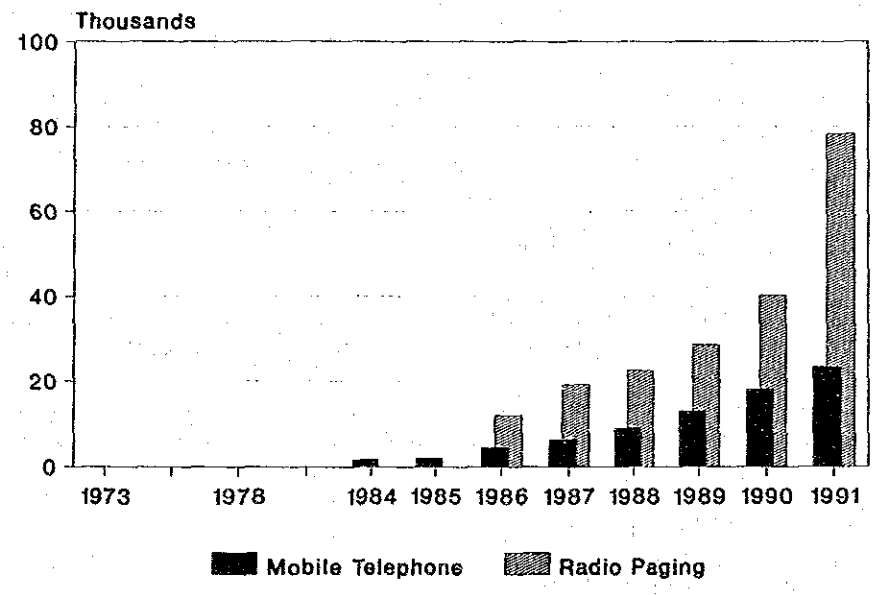


Figure 1-4-5 Mobile Communication Service in Indonesia

3. FACILITIES

The public telecommunications networks at present are as follows:

a) Telephone Network;
b) Telex Network; and
c) Packet Data Network.

3.1 Telephone Network

The telephone network is composed of the following hierarchical structure:

a)	International Switching Center (ISC) (Jakarta-I, II and Medan)	: 3
b)	Tertiary Center (TC) (Surabaya, Jakarta, Ujung Pandang, Banjarmasin, Medan, Palembang, and Ambon)	: 7
c)	Secondary Center (SC)	: 33
d)	Primary Center (PC)	: 189
e)	Local Exchange (LE)	: 819

The telephone switching systems include of the manual board, analog and digital switching equipment.

The following three digital switching systems have been provided as the national standard switching systems:

a) EWSD;
b) No.5 ESS; and
c) NEAX-61.

The existing telephone switching systems are summarized in Table 1-4-5. Figure 1-4-6 shows Subscriber's Long Distance Dialling (SLDD) network in Indonesia.

Table 1-4-5 Summary of Telephone Switching System operated as of End of 1991

Category	Provision	% to Total
<No.of Exchanges>	819	(100%)
Automatic	536	65%
Manual	283	35%
<No. of Switching Units>	856	(100%)
Digital (EWSD, No.5 ESS, NEAX, KY-1000)	360	42%
Analog (ARF102, PC1000, EMD, NEC230, AKD, PRX, MC10C, HTC-C23, ESK-1000, ARM)	203	24%
Manual Boards	293	34%
<Exchange Capacity>(LU)	1,565,000	(100%)
Digital	841,000	54%
Analog	674,000	43%
Manual	50,000	3%

3.2 Telex Network

The telex network is composed of three hierarchical structure, that is:

a) Tandem International Switching Center (TISC): 3
b) Tandem National Switching Center (TNSC) : 5
c) Terminal Exchange (TE) : 52

The growth of demand of the telex service, especially in urban areas, is stagnant in reverse with growth of telefax (G3 Facsimile).

Current telex network in Indonesia is shown in Figure 1-4-7 and summary of the switching system is as following Table 1-4-6.

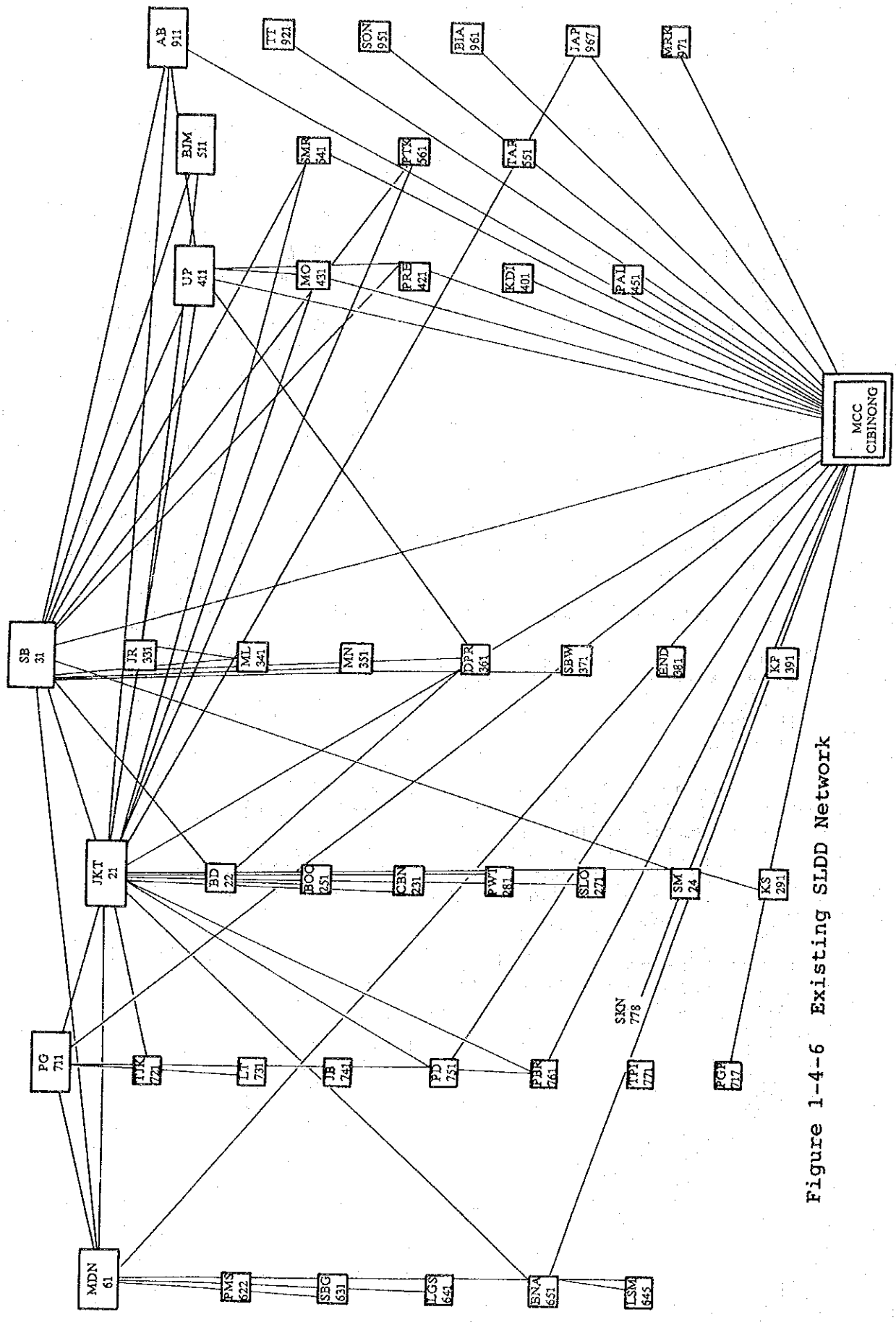


Figure 1-4-6 Existing SLDD Network

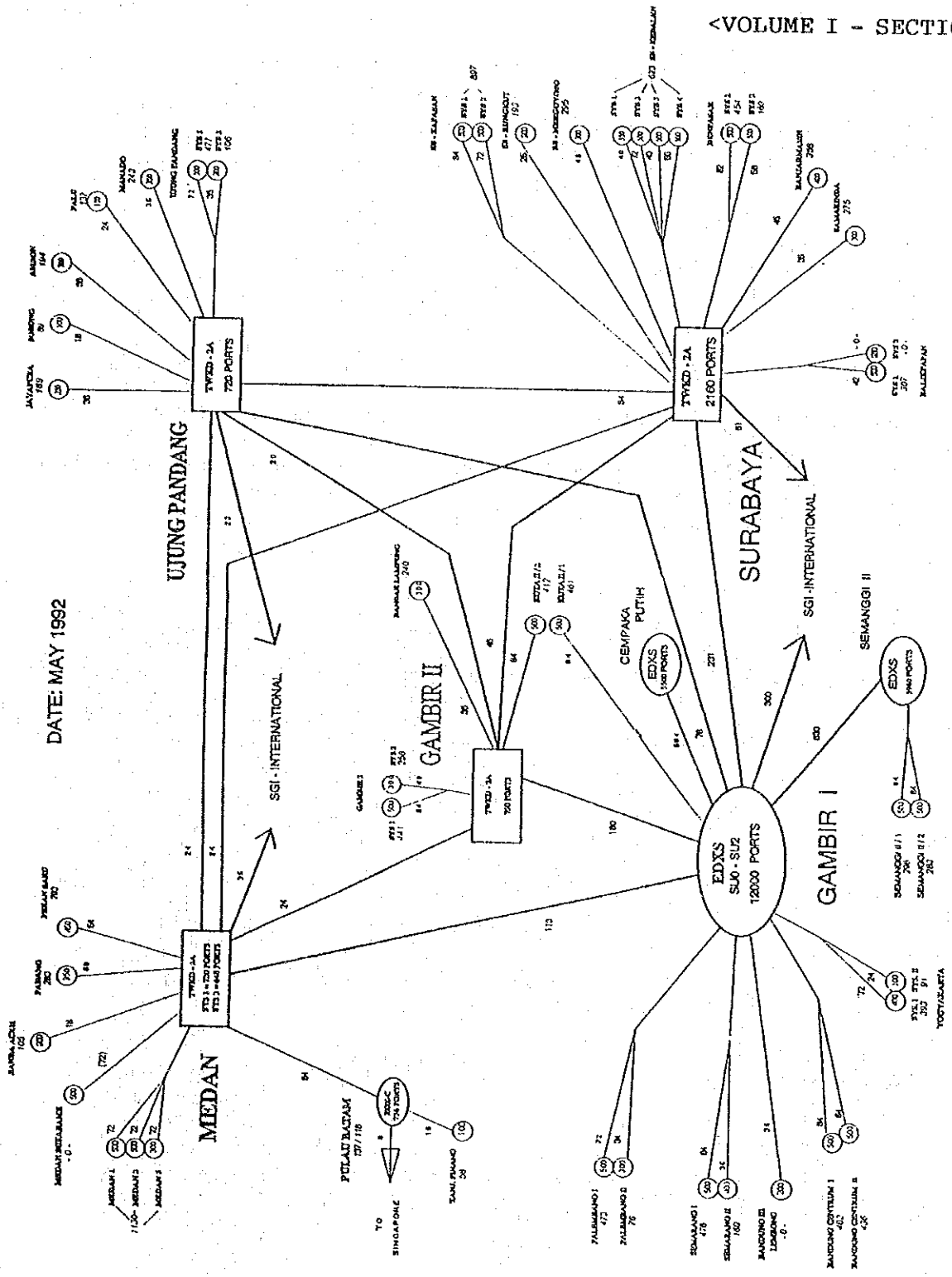


Figure 1-4-7 Existing Telex Network

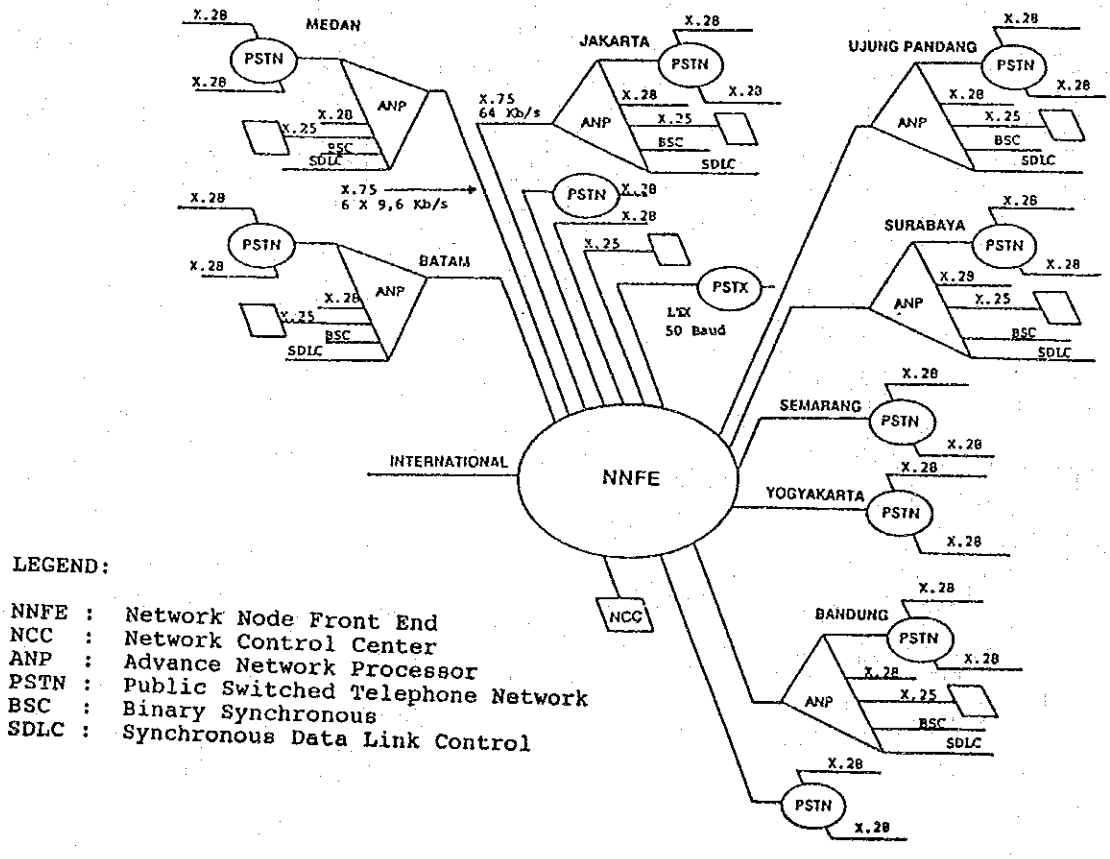
4-17

Table 1-4-6 Summary of Telex Switching System operated as of end of 1991

Description		Provision
Number of Telex Exchanges	:	35
Capacity of Exchange (LU)	:	28,550

3.3 Packet Data Network

The existing packet data network composed of EDX-P packet switching equipment are provided in major cities. Approximately 600 packet terminals are connected applying X.25 and X.28 protocols. Figure 1-4-8 shows the existing packet data network in Indonesia.



LEGEND:

NNFE : Network Node Front End
NCC : Network Control Center
ANP : Advance Network Processor
PSTN : Public Switched Telephone Network
BSC : Binary Synchronous
SDLC : Synchronous Data Link Control

Figure 1-4-8 Existing Packet Data Network

3.4 Transmission System

As backbone transmission system in Indonesia, terrestrial microwave and optical fiber cable including submarine cable, and domestic satellite systems are now in use.

For spur and junction routes, UHF/VHF, coaxial cable, cable PCM and fiber cable systems are applied.

Other than the above, HF and open-wire systems are still used for isolated areas.

Table 1-4-7 shows application of existing transmission system.

Table 1-4-7 Application of Transmission System

Category	Backbone	Spur	Junction	Backup
Microwave	o	o	o	-
Fiber Cable	o	-	o	-
Submarine Cable	o	-	-	-
Satellite	o	o	-	o
UHF/VHF	-	o	-	-
Coaxial Cable	-	o	o	-
Cable PCM	-	o	o	-
HF	-	o	-	o
Open-wire	-	o	-	-
Troposcatter	-	-	-	o

3.4.1 Terrestrial Backbone System

Nationwide terrestrial backbone routes from Sumatra up to Kalimantan and Sulawesi via Jawa are illustrated in Figure 1-4-9.

The main systems which form the backbone systems are shown in the Table 1-4-8.

The troposcatter system between Jawa and Kalimantan has been recently replaced with submarine optical fiber cable system. Then the troposcatter becomes a backup system.

Table 1-4-8 Terrestrial Transmission System (1/2)

File:TB0001-2.WK1

System Name	Summary	Distance (km)	No. of Station Terminal	No. of Station Repeater	Start of Operation	Related Spur Link	Remarks
Jawa-Bali (Analog Microwave)	4GHz (1260ch) 2+1: Jakarta-Surabaya 1+1: Surabaya-Denpasar	1,353	10	22	1973	7GHz (960/300ch) 16hops 425km	
Surabaya -Banjarmasin Troposcatter (Analog Microwave)	2/4GHz (120ch) 1+1: Surabaya-Banjarmasin	525	2	3	1974	7GHz (300ch) 1hop 34km	From 1992.2, backup for Surabaya-Banjarmasin Submarine Cable
Trans Sumatra (Analog Microwave)	4GHz (1260ch) 1+1: Jakarta-Medan	1,960	9	38	1975	2GHz (120/60ch) 6hops 104km	
Bagian Timur (Analog Microwave)	4/U6GHz (1260ch) 1+1: Denpasar-Ujung Pandang	1,108	6	11	1978	400MHz (24ch) 2hops 124km	
Balik Papan -Samarinda (Analog Microwave)	U6GHz (1260ch) 1+1: Balik Papan-Samarinda	92	2	2 Tail link: 1hop (Cable)	1978	None	
Medan-Banda Aceh (Analog Microwave)	U6/7GHz (1260ch) 1+1: Medan-Banda Aceh	503	7	10	1982	800MHz (120ch) 5hops 116km	
Jakarta-Surabaya (Optical Fiber)	1300nm (140Mbit/s) 3+1: Jakarta-Madium 2+1: Madium-Surabaya 1+1: Chibatu-Garut 2+1: Kroya-Purwakarto	1,034	26	12	1991	None	
Surabaya -Banjarmasin (Submarine Cable)	1300nm (280Mbit/s) 1: Bumianyar-Takisung	388	2	6	1992	None	Back haul: 5hops 125km
Banjarmasin -Balik Papan (Digital Microwave)	2GHz (34Mbit/s) 1+1: Banjarmasin-Balik Papan	473	10	4	1992	None	
2nd Jawa-Bali (Digital Microwave)	U6GHz (140Mbit/s) 3+1: Jakarta-Solo 2+1: Solo-Jember 1+1: Jember-Denpasar	1,366	11	26 Tail link: 4hops (Cable)	1992	2GHz (34Mbit/s) 11hops 311km	

Table 1-4-8 Terrestrial Transmission System (2/2)

File:TB0001-2.WK1

System Name	Summary	Distance (km)	No. of Station Terminal	Repeater	Start of Operation	Related Spur Link	Remarks
Cross Sumatra (Digital Microwave)	U6GHz (140Mbit/s) 1+1: Padan-Palembang U6/2GHz (34Mbit/s) 1+1: Padan-Tj Pinan Bt Sulap-Bengkulu	1,501	9 Tail link: 1hop	31 (Cable)	1992	U6/2GHz (8Mbit/s) 6hops 242km	
2nd Trans Sumatra (Digital Microwave)	U6GHz (140Mbit/s) 3+1: Jakarta-Bt Asam 2+: Bt Asam-Bt Pedukuh 1+: Bt Pedukuh-Padan Bt Asam-Palembang 2+1: Padan-Medan 1+1: Gn Balau-Tj Karang Bt Pedukuh-Jambi	1,931	6 Tail link: 1hop	41 (Cable)	(1993)	7/2GHz (34/8Mbit/s) 27hops 792km	On-going
Cross Karimantan-I (Digital Microwave)	U6GHz (140Mbit/s) 1+1: Banjarmasin-Kendawangan Balik Papan-Samarinda	725	7 Tail link: 2hops	13 (Cable)	(1993)	None	On-going
Cross Karimantan-II (Digital Microwave)	U6GHz (140Mbit/s) 1+1: Gn Marau-Pontianak 2GHz (34Mbit/s) 1+1: Pontianak-Sambas Pontianak-Putus Sibau Samarinda-Nunukan	1,633	16 Tail link: 2hops	34 (Cable)	(1994)	None	On-going
Trans Sulawesi-I (Digital Microwave)	U6GHz (140Mbit/s) 3+1: Ujung Pandang-Buntu Siring 2+1: Buntu Siring-Parigi 1+1: Gn Patirosompa-Pare Pare Parigi-Palu Buntu Siring-Kendari 2+1: Wawo-Manad 1+1: Gn Tumba-Wawo	1,303	6	37	(1993)	2GHz (34/8Mbit/s) 13hops 242km	On-going
Trans Sulawesi-II (Digital Microwave)	U6GHz (140Mbit/s) 1+1: Parigi-Gn Tumba	424	0	10	(1994)	2GHz (34Mbit/s) 11hops 407km Tail link: 2hops	On-going
Nusa Tenggara (Digital Microwave)	U6GHz (140Mbit/s) 1+1: Denpasar-Kupan Gn Gug uleur-Dili	1,508	7	9	(1994)	2GHz (34/8Mbit/s) 11hops 160km	On-going

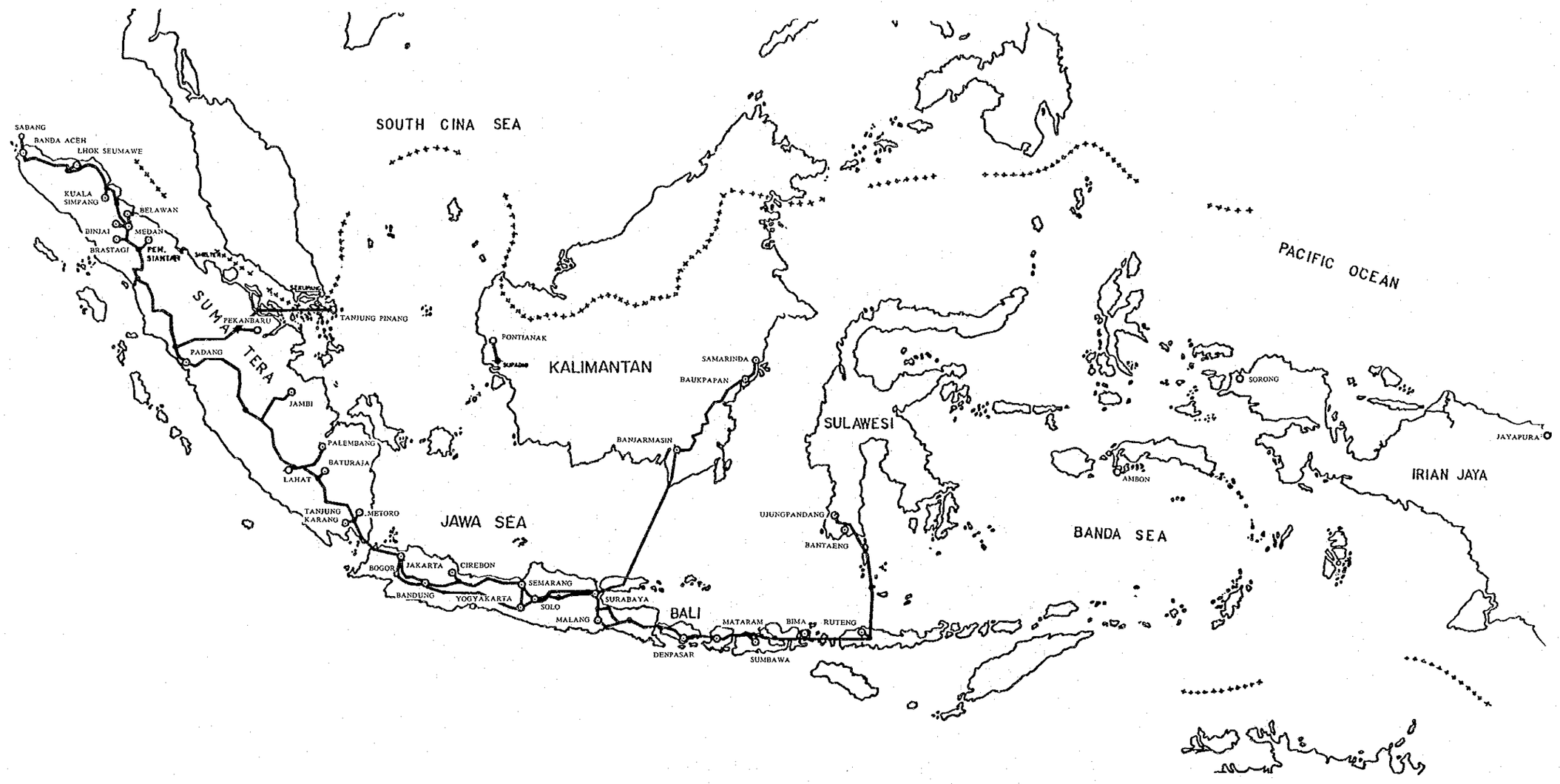


Figure 1-4-9 Existing Terrestrial Backbone System

3.4.2 Satellite System

PALAPA, domestic satellite, plays an important role as communication means for isolated islands and remote areas.

Furthermore, PALAPA carries not only domestic TV signals and but also signals for third parties in ASEAN countries.

The summary of PALAPA satellite system is shown in Table 1-4-9, and the location of earth stations are illustrated in Figure 1-4-10.

Table 1-4-9 Summary of PALAPA Satellite System operated as of June 1992

Category			Quantity
Satellite	PALAPA-B2P	(launched in 1987):	24 Transponders
	PALAPA-B2R	(launched in 1990):	24 ditto
	PALAPA-B4	(launched in 1992):	24 "
Earth Station	FDM/FM	operation :	19 Stations
	TDMA	operation :	11 ditto
	SCPC	operation :	236 "

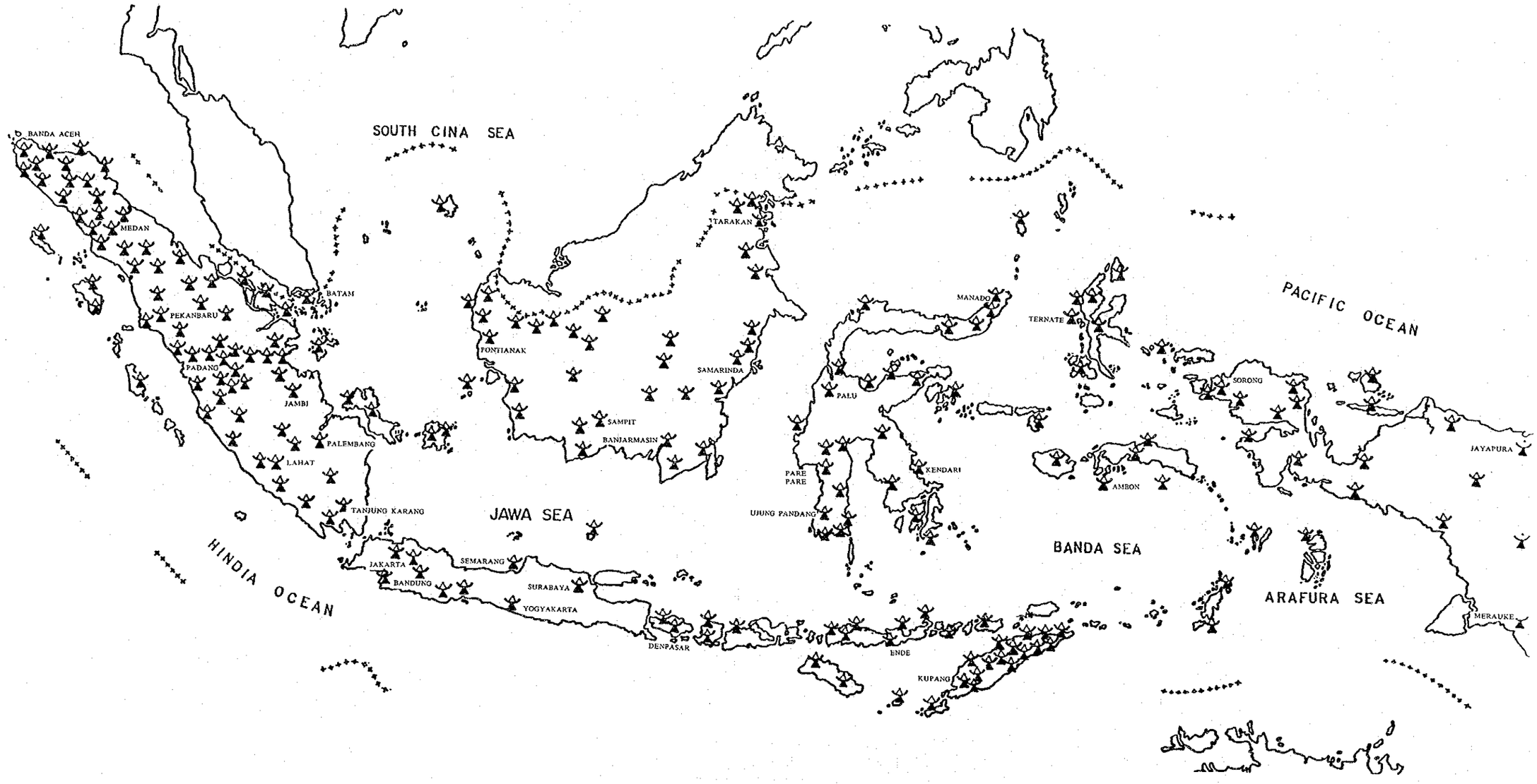


Figure 1-4-10 Existing Earth Station of PALAPA Satellite System

3.5 Outside Plant

Outside plant is categorized by types of cable and associated hardware.

Cable types are of old quaded, paper-insulated lead sheath, modern plastic-insulated and color-coded. As the system was expanded, the plastic-insulated jelly-filled cables were mainly introduced. These cables range from 100 pairs to 2,400 pairs for primary cables.

According to WITEL records, at the end of year 1991, there were approximately 1,250,000 working telephone instruments in service in country wide.

Approximately, 26,000 distribution terminals and 2,600 cross connection cabinets are installed in the country.

The average length of drop wire and inside wire per telephone installed is estimated 70 meters and 35 meters, respectively.

It is estimated that there are more than 1,107,000 poles of 7-8 meters high to support the aerial telephone plant.

The underground conduit system consists of approximately 9,200 km of duct length, with 73,400 manholes.

The amount of sheathed cable pairs (primary basis) is estimated as follows:

* 1,467,600 pairs at the end of 1991; and
* 2,112,000 pairs at the end of REPELITA-V.

4. PRESENT FINANCIAL AND FUNDING CONDITION

4.1 PERUMTEL's Financial Performance

PERUMTEL's financial performance over FY86-91 period fallS in satisfactory level. PERUMTEL's audited and unaudited financial statements and performance indicators for FY86-91 are attached in Annex 3.

PERUMTEL has been profitable during the 1986 to 1991 period. The increase in tariff in October 1990, helped improvement of PERUMTEL's financial performance in 1991. The rate of return on book valued net fixed assets in operation increased from 12% in 1990 to 21%.

As ratios of net internal cash (after debt service and mandatory contributions) to average two year investment (current and next year), which have been higher than 40 percent except for 1990, show, PERUMTEL has generated internal funds at satisfactory level. Depreciation and other noncash expenditures and deferred income from installation fees occupy most of internal funds for investments. Since 55 percent of net profit has been transferred to the Government as dividend, the share of retained earnings in capital investment was relatively small. With the change of corporate status, TELKOM's annual dividend payment and allocation of profit each year are decided by the Shareholder (presently the Government) on an annual basis based on TELKOM's performance and funding needs.

PERUMTEL's financial position was sound during the period from 1986 to 1991. The debt equity ratio remained below 60:40 and debt service coverage kept above 2.0 level.

TELKOM's opening balance sheet as September 24, 1991 is summarized in Annex 3. Since the Government converted dividend payment of Rp. 164 billion for FY 91 and the outstanding Government loans, other than World Bank Loans, of Rp. 632 billion, TELKOM's financial position is satisfactory. Among the authorized capital of Rp. 10 trillion, Rp. 2 trillion has been paid in which consists of PERUMTEL's equity of Rp. 1,204 billion as of September 23, 1991 and the above mentioned amount arranged by the Government.

4.2 Investment Funding

Amount of capital investment increased rapidly from 1990. Funds for capital investment has become reliant to the foreign loan since 1991. Most of investment fund in 1991 was covered by foreign loans. At the same time PBH began to contribute capital investment from 1991.