


MINISTRY OF INTERNATIONAL COOPERATION AND ASSISTANCE
INTERNATIONAL COMMUNICATIONS CENTER

THE STUDY
ON
THE STATE OF COMMUNICATIONS DEVELOPMENT
IN
MALI PEOPLE'S DEMOCRATIC REPUBLIC

FINAL REPORT
(MANUSCRIPT)

NOVEMBER 2002

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MINISTRY OF COMMUNICATION, TRANSPORT, POST AND CONSTRUCTION
ENTERPRISE OF TELECOMMUNICATIONS LAO

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NIPPON KOEI CO.,LTD.
INFOCOM RESEARCH, INC.



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PREFACE

In response to a request from the Government of Lao People's Democratic Republic, the Government of Japan decided to conduct the Study on the Telecommunications Development in Lao People's Democratic Republic and entrusted the study to the Japan International Cooperation Agency (JICA).


JICA dispatched a study team headed by Dr. Tomotaka TANIGUCHI of Nippon Koei Co., Ltd. organized by Nippon Koei Co., Ltd. and InfoCom Research, Inc. to Lao P.D.R. three times from October 2001 to November 2002.

The team held discussions with the officials concerned of the Government of Lao P.D.R., and conducted related field surveys. After returning to Japan, the team conducted further studies and compiled the final results in this report.

I hope this report will contribute to the improvement of the situation of telecommunication services in Lao P.D.R. and to enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Lao P.D.R. for their close cooperation throughout the study.

November 2002



Takao KAWAKAMI

President

Japan International Cooperation Agency

November 2002

Mr. Takao Kawakami
President
Japan International Cooperation Agency
Tokyo, Japan

Dear Mr. Kawakami,

Letter of Transmittal

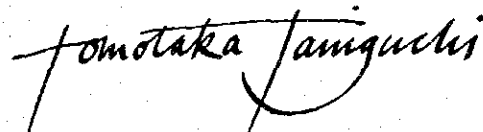
We are pleased to submit you the final report on the Study on The Telecommunications Development in Lao People's Democratic Republic.

This study was conducted by the joint venture of Nippon Koei Co., Ltd. and InfoCom Research, Inc. under a contract to JICA, during the period from October 2001 to November 2002. In conducting the study, we have formulated the Master Plan for the telecommunications development in Lao P.D.R. up to year 2015.

We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, the Ministry of Foreign Affairs and the Ministry of Public Management, Home Affairs, Posts and Telecommunications. We would also like to express our gratitude to the officials concerned of the Ministry of Communication, Transport, Post and Construction, the Enterprise of Telecommunications Lao and Embassy of Japan in Lao P.D.R. for their cooperation and assistance throughout our field survey.

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

Very truly yours,



Tomotaka TANIGUCHI

Team Leader

The Study on The Telecommunications Development in
Lao People's Democratic Republic

Nippon Koei Co., Ltd.

THE STUDY
ON
THE TELECOMMUNICATIONS DEVELOPMENT
IN
LAO PEOPLE'S DEMOCRATIC REPUBLIC

**FINAL REPORT
(Main Report)**

CONTENTS

EXECUTIVE SUMMARY

CHAPTER 1 INTRODUCTION

1.1	General.....	1-1
1.2	Background of the Study.....	1-1
1.3	Objectives and Scope of the Study.....	1-2
1.3.1	Objective of the Study.....	1-2
1.3.2	Study Area.....	1-2
1.3.3	Stages of the Study.....	1-2
1.4	Approaches and Methodology of the Study.....	1-5
1.4.1	Flow of the Study.....	1-5
1.4.2	The First-Year Stage (October 2001 to March 2002).....	1-5
1.4.3	The Second-Year Stage (May 2002 to October 2002).....	1-6
1.5	Organization of the Study Team.....	1-9
1.5.1	The Study Team and Counterpart Staff.....	1-9
1.5.2	JICA Advisory Committee and Other Persons Involved with the Study.....	1-9
1.6	Schedules of the Study.....	1-10
1.7	Technology Transfer.....	1-12

CHAPTER 2 SOCIO-ECONOMIC OVERVIEW AND TELECOMMUNICATIONS

2.1	Topographical Features.....	2-1
2.2	Population Features.....	2-5
2.2.1	1995 National Population Census.....	2-5
2.2.2	State Planning Committee (SPC) Population Projection.....	2-5
2.3	Economic Features.....	2-6
2.3.1	Status of Income and Expenditure in Lao P.D.R.....	2-6
2.3.2	SPC "Draft Socio-Economic Development Strategy".....	2-7
2.4	Telecommunications in Lao P.D.R.....	2-9

CHAPTER 3 ICDEVELOPMENT

3.1	ICT development in Lao P.D.R.	3-1
3.1.1	Introduction	3-1
3.1.2	Outline of present status of Information Technology (Computerization) in Lao P.D.R.	3-2
3.1.3	Networked Readiness in Lao P.D.R.	3-3
3.1.4	ICT Development Scenario in Lao P.D.R.	3-7
3.1.5	Milestone of ICT Development in Telecommunications sector	3-15
3.2	ICT Applications	3-17
3.2.1	Telemedicine	3-17
3.2.2	e-Education	3-17
3.2.3	e-Government	3-18
3.2.4	e-Commerce	3-19
3.3	Recommendation	3-19
3.3.1	Recommended Procedure for MCTPC to develop ICT	3-19
3.3.2	Recommendations	3-20

CHAPTER 4 TELECOMMUNICATIONS DEMAND FORECAST

4.1	Movement of Telecommunications Services in Lao P.D.R.	4-1
4.2	Telecommunications Demand Studies in Lao P.D.R.	4-3
4.3	Method of Approach for Demand Forecast in Lao P.D.R.	4-4
4.4	Evaluation of Telecommunications Demand Forecast in Lao P.D.R.	4-6

CHAPTER 5 TRAFFIC FORECAST

5.1	Telephone Traffic	5-1
5.1.1	Telephone Traffic characteristics	5-1
5.1.2	Mobile and Internet Inter-connecting Traffic characteristics	5-3
5.1.3	International Telephone Traffic characteristics	5-4
5.2	Telephone Traffic Estimation	5-5
5.2.1	Traffic Matrix for 2005, 2010, and 2015	5-5
5.3	International Telephone Traffic	5-9

CHAPTER 6 TELECOMMUNICATIONS POLICY, LAWS AND REGULATION

6.1	Information Society and Infocom Policy	6-1
6.2	Aims and Roles of Telecommunications Policy	6-2
6.2.1	Consumer Protection	6-2
6.2.2	Contribution to Socioeconomic Development	6-3
6.2.3	National Security	6-3
6.3	Direction and Prospect of Telecommunications Sector Development	6-3
6.4	Guidelines for Telecommunications Policy in Lao P.D.R. towards Year 2015	6-5
6.4.1	Liberalization and Competition Policy	6-5

6.4.2	Tariff Policy including Interconnection Charges	6-6
6.4.3	Financing Policy	6-6
6.4.4	Policy for bridging the Digital Divide	6-7
6.4.5	Specific Measures of Telecommunications Policy for Development of the Laos	6-8
6.5	Legal System	6-19
6.5.1	TELECOMMUNICATIONS ACT	6-19
6.5.2	Radio Act	6-20
6.5.3	Telecommunications Business Act	6-21
6.6	Regulations	6-22
6.6.1	Principles of Regulations	6-22
6.6.2	Telecommunications Business Regulation	6-23
6.6.3	Tariff Regulation	6-23
6.6.4	Interconnection Regulation	6-26
6.6.5	Licensing of spectrum usage	6-26
6.6.6	Standards	6-26
6.6.7	Qualification	6-27
6.6.8	INTERNET	6-27

CHAPTER 7 NETWORK DEVELOPMENT PLANNING

7.1	Current Status of Network	7-1
7.1.1	Current Status of the Network Services in Lao P.D.R.	7-3
7.1.2	Current Numbering Plan	7-7
7.1.3	Switching System	7-10
7.1.4	Current Transmission Network	7-14
7.1.5	Outside Plant	7-20
7.1.6	Internet	7-23
7.1.7	Other Networks	7-29
7.2	Current ETL Planning	7-34
7.3	Transition to the IP Integrated Network	7-39
7.4	Network Planning for the Future	7-46
7.4.1	Improvement of Future Telecommunication Services	7-46
7.4.2	Network Architecture	7-49
7.4.3	Numbering Plan	7-54
7.4.4	Switching Plan	7-57
7.4.5	Transmission Network Planning	7-63
7.4.6	Outside Plant Planning	7-73
7.4.7	IP Network Planning	7-76
7.4.8	Other Networks	7-93

CHAPTER 8 RURAL TELECOMMUNICATIONS

8.1	Current Situation in Lao P.D.R.	8-1
8.1.1	General view	8-1

8.1.2	Rural Telecommunications Network being installed by LTC (Rutel).....	8-1
8.1.3	Telecommunications Network for the Ministry of Health.....	8-2
8.2	Rural telecommunications of the world.....	8-4
8.2.1	ITU's activity.....	8-4
8.2.2	Japanese experience.....	8-7
8.2.3	Lesson from other countries.....	8-8
8.3	Importance of Public Telephone.....	8-10
8.4	Practical Approach in Lao P.D.R.....	8-11
8.4.1	General Consideration.....	8-11
8.4.2	Implementation methods.....	8-12
8.4.3	Power Supply issue.....	8-14
8.5	Funding Problem.....	8-14
8.6	Scale of Implementation.....	8-15

CHAPTER 9 OPERATION AND MAINTENANCE

9.1	Strategy and Organization.....	9-1
9.2	Switching Network.....	9-4
9.2.1	Switching system Operation and Maintenance Structure.....	9-4
9.2.2	OMC Arrangements for Network Operation and Management.....	9-6
9.3	Transmission (MW/OFC/Mobile) Network.....	9-7
9.3.1	Microwave Transmission Networks.....	9-7
9.3.2	OFC Transmission Networks.....	9-8
9.3.3	Mobile Telephone Network.....	9-14
9.3.4	Satellite Earth Transmission.....	9-15
9.4	Outside Plant.....	9-15
9.4.1	Current Status of OSP Maintenance Activities.....	9-15
9.4.2	Current status of OSP Maintenance Center.....	9-16
9.5	Number of Staff.....	9-17
9.6	Supporting Facilities.....	9-21
9.6.1	Network Management Centers.....	9-21
9.6.2	Telecommunication Management Network.....	9-21
9.6.3	OSP Maintenance Center.....	9-22

CHAPTER 10 HUMAN RESOURCES DEVELOPMENT

10.1	General.....	10-1
10.2	Current Situation of Human Resources in Relevant Organizations.....	10-1
10.3	Current Situation of HRD.....	10-5
10.4	Demand and Supply of Human Resources.....	10-13
10.5	Human Resources Development Plan.....	10-16

CHAPTER 11 FINANCIAL AND ECONOMIC EVALUATION

11.1 Analytical Framework.....	11-1
11.1.1 Capital Expenditure (CAPEX).....	11-1
11.1.2 Beneficiaries.....	11-5
11.1.3 Methodologies.....	11-6
11.2 Assumptions.....	11-7
11.2.1 Revenue Assumptions.....	11-7
11.2.2 Financial Cost Assumptions.....	11-9
11.2.3 Economic Benefit Assumptions.....	11-16
11.2.4 Economic Cost Assumptions.....	11-17
11.3 Result.....	11-17
11.3.1 FIRR Estimation.....	11-17
11.3.2 Sensitivity Analysis of FIRR.....	11-22
11.3.3 EIRR Estimation.....	11-25
11.3.4 Sensitivity Analysis on EIRR.....	11-28
11.3.5 Result of the financial and economic evaluation.....	11-30

CHAPTER 12 RECOMMENDATION

12.1 Recommendation.....	12-1
12.1.1 Setting up Firm Policy of Telecommunications.....	12-1
12.1.2 Installation of Backbone Network to lead to ICT Development.....	12-5
12.1.3 Consideration for Transition to IP Network.....	12-6
12.1.4 Consideration for Rural Communications.....	12-7
12.1.5 Setting up Strategy and Organization for better O & M.....	12-7
12.1.6 Introduction of Strategic Human Resource Development.....	12-9
12.2 Priority Projects.....	12-10
12.2.1 OFC network installation of P/J No. 3, 6, 7, and 11 for the year by 2005.....	12-11
12.2.2 OFC network installation of P/J No.5, 6 and 23 for the year by 2010.....	12-12
12.2.3 OFC network installation of P/J No. 18, 19, 20, 21, 24 and 25 for the year by 2015.....	12-13

List of Tables

Table 1.1	The JICA Study Team and Working Group assigned by MCTPC	1-9
Table 1.2	JICA Advisory Committee	1-10
Table 1.3	Other People who Supported the Study.....	1-10
Table 1.4	Work Schedule.....	1-11
Table 2.1	Lao Proportion of Population and Area Size in Neighboring Countries	2-1
Table 2.2	Rural Area Classification	2-3
Table 2.3	Major Urban Center Classification	2-4
Table 2.4	Population Projection for Lao P.D.R., 1995-2020	2-6
Table 2.5	Recent Socio-Economic Strategy for 2020, 2010 and 2005 in Lao P.D.R.....	2-8
Table 2.6	Sector Projections to 2020	2-9
Table 2.7	Current number of Telephone Subscribers	2-11
Table 2.8	Number of Mobile subscribers and Internet Users	2-12
Table 2.9	Telecommunications Service in Lao P.D.R.. (1996-2001)	2-13
Table 2.10	Telecommunications Services in Selected Asia Countries (Fixed +Mobile)	2-14
Table 2.11	Regional Disparity of Telephone Line Density in Selected Countries (1998 & 2000).....	2-15
Table 2.12	Telecommunications Density by Type of Services in Selected Countries	2-15
Table 3.1	Milestone of ICT Development in Lao P.D.R.	3-16
Table 4.1	Telecommunications Service in Lao P.D.R. (1996-2001)	4-1
Table 4.2	Comparison of Fixed Telephone Demands projected by Previous Studies	4-3
Table 4.3	Projection of Fixed and Mobile Subscribers in Asian Countries (ITU)	4-3
Table 4.4	The Results of Telecommunication Demand Forecasts in 2005, 2010 and 2015	4-6
Table 4.5	Comparison of Results of Telecommunication Demand Forecasts by Previous Studies and JICA Telecommunications Master Plan Study	4-8
Table 5.1	Calling Rate.....	5-2
Table 5.2	Proportion of calls observed in week	5-2
Table 5.3	Proportion of Calls	5-2
Table 5.4	Busy Hour Call Concentration Ratio (June 200).....	5-3
Table 5.5	Fixed Telephone Transit Traffic Matrix for Year 2005	5-6
Table 5.6	Fixed Telephone Transit Traffic Matrix for Year 2010	5-7
Table 5.7	Fixed Telephone Transit Traffic Matrix for Year 2015	5-8
Table 5.8	International Telephone Traffic (outgoing traffic).....	5-9
Table 5.9	Estimated International Traffic.....	5-10
Table 5.10	Estimated International Calls.....	5-10
Table 5.11	International Traffic Estimation	5-10
Table 6.1	Types of Liberalization Policy according to ownership of facilities	6-12
Table 6.2	Discretionary and Rule-based Regulation	6-22
Table 7.1	Current Numbering Plan in Lao P.D.R.	7-9
Table 7.2	Number of Mobile subscribers.....	7-11
Table 7.3	Demand of Mobile subscribers.....	7-12
Table 7.4	Current Microwave Network Facilities.....	7-15
Table 7.5	Intra-Provincial Network	7-17

Table 7.6	LaoTel Internet Connection Equipment and Channels	7-25
Table 7.7	Direct Channels (IDR Carrier for 10 countries).....	7-32
Table 7.8	For the Technology and Important Decision Items	7-45
Table 7.9	Network Services for Lao P.D.R.	7-48
Table 7.10	Concept for Future Numbering Plan for Lao P.D.R.	7-55
Table 7.11	Possible Future Numbering Plan for Lao P.D.R. detail allocation example	7-56
Table 7.12	Special special numbering chart for Fixed line services.....	7-57
Table 7.13	Expanding Target of Transmission Networks and Capacities	7-65
Table 7.14	OFC Transmission Networks.....	7-67
Table 7.15	Primary Cable Capacity	7-73
Table 7.16	Dial-up ports and the number of ADSL ports installed in each periods	7-82
Table 7.17	Estimated numbers of servers necessary.....	7-91
Table 7.18	Estimated numbers of routers necessary	7-91
Table 7.19	Estimated cost.....	7-92
Table 7.20	Expanding Target of Mobile Services.....	7-96
Table 8.1	Indicative cost per line of urban and rural telecommunications	8-7
Table 9.1	OMC Arrangements for Switching System.....	9-7
Table 9.2	Installation Plan of BTS	9-14
Table 9.3	Allotment of Staff in 2005.....	9-18
Table 9.4	Allotment of Staff in 2010.....	9-19
Table 9.5	Allotment of Staff in 2015.....	9-20
Table 10.1	Current Official Task of Telecom Division in MPTPC.....	10-2
Table 10.2	ETL Staff for year 2001 and target for year 2005	10-3
Table 10.3	Number of Staff by Province.....	10-5
Table 10.4	LTC Funded Local Seminars and Training Courses as of 2000	10-6
Table 10.5	LTC Funded Local Seminars and Training Courses as of 2001(1st Half)	10-7
Table 10.6	Number of Trainees in TCTI in June 2002.....	10-8
Table 10.7	Number of Trainees by Original Organs and Tuition Fee.....	10-9
Table 10.8	Number of Enrolled Students in NUOL (2001).....	10-12
Table 10.9	Number of Graduates in Faculty of Engineering & Architecture (2000).....	10-12
Table 10.10	Overseas Seminar and Training Courses as of 2000.....	10-13
Table 10.11	Number of Employment for Telecommunication Sector (Estimates)	10-14
Table 10.12	Estimates of Employment by Category.....	10-14
Table 10.13	Demand of Employment by Types of Job per Year	10-15
Table 11.1	First Scenario.....	11-2
Table 11.2	Second Scenario.....	11-2
Table 11.3	CAPEX (Scenario 1).....	11-4
Table 11.4	CAPEX (Scenario 2).....	11-4
Table 11.5	Number of Subscribers at the End of the Year	11-5
Table 11.7	OPEX of the 1st Scenario with the mobile phones.....	11-11
Table 11.8	OPEX of the 1st Scenario without the mobile phones.....	11-12
Table 11.9	OPEX of the 2nd Scenario with the mobile phones	11-13
Table 11.10	OPEX of the 2nd Scenario without the mobile phones	11-14
Table 11.11	Base assumptions for calculating the Economic Benefit.....	11-16
Table 11.12	FIRR of the 1st Scenario with the mobile phones	11-18
Table 11.13	FIRR of the 1st Scenario without the mobile phones	11-19

Table 11.14	FIRR of the 2nd Scenario with the mobile phones	11-20
Table 11.15	FIRR of the 2nd Scenario without the mobile phones	11-21
Table 11.16	Sensitivity Analysis of FIRR on the Major Assumptions	11-24
Table 11.17	EIRR of the 1st Scenario with the mobile phones	11-26
Table 11.18	EIRR of the 1st Scenario without the mobile phones	11-26
Table 11.19	EIRR of the 2nd Scenario with the mobile phones	11-27
Table 11.20	EIRR of the 2nd Scenario without the mobile phones	11-27
Table 11.21	Sensitivity Analysis of EIRR on the Change in Major Assumptions	11-29
Table 11.22	The Result of the Evaluation	11-30

List of Figures

Fig. 1.1	Flow Chart of the Study	1-4
Fig. 2.1	Total and Urban Population Distribution in Lao P.D.R. (1995 Census).....	2-4
Fig. 2.2	Proposed GMS Telecommunications Backbone Projects	2-10
Fig. 3.1	Networked Readiness in Lao P.D.R. (including Vientiane Municipality)	3-4
Fig. 3.2	Networked Readiness in Lao P.D.R. (excluding Vientiane Municipality)	3-4
Fig. 3.3	Networked Readiness in Vientiane Municipality	3-5
Fig. 3.4	Potential for ICT Development in Lao P.D.R in 2005.....	3-8
Fig. 3.5	Potential for ICT Development in Lao P.D.R in 2010.....	3-11
Fig. 3.6	Potential for ICT Development in Lao P.D.R in 2015.....	3-13
Fig. 4.1	Main Telephone Lines per 1,000 inhabitant In Asian Countries	4-2
Fig. 4.2	Cellular Subscribers per 1,000 Inhabitants n Asian Countries	4-2
Fig. 4.3	Personal Computers per 1,000 inhabitants in Asian Countries.....	4-2
Fig. 4.4	Internet Hosts per 10,000 inhabitants in Asian Countries	4-2
Fig. 4.5	Telecommunications Demand Forecast Procedures in Lao P.D.R.....	4-5
Fig. 4.6	Comparing results of Macro Demand Approach with Micro Demand Approach (Fixed Main Lines)	4-7
Fig. 4.7	Comparing results of Macro Demand Approach with Micro Demand Approach (Mobile Subscribers).....	4-7
Fig. 5.1	Incoming and outgoing Traffic Variation.....	5-1
Fig. 5.2	GSM Traffic Variation (June 2001)	5-3
Fig. 5.3	Internet Traffic Variation (June 2001).....	5-4
Fig. 5.4	Internet Traffic Variation (June 2001).....	5-4
Fig. 5.5	Diagram for estimating traffic matrix	5-5
Fig. 5.6	International Telephone Traffic (outgoing traffic).....	5-9
Fig. 6.1	Law System.....	6-19
Fig. 6.2	Exchange rate of Kip/\$	6-24
Fig. 6.3	Telephone Revenue 1993-1998 (Source: LTC)	6-25
Fig. 7.1	Microwave Transmission Network (Current).....	7-2
Fig. 7.2	Numbering Plan In The Lao P.D.R.	7-8
Fig. 7.3	Schematic Diagram of the Existing Telephone Network Structure.....	7-13
Fig. 7.4	Existing Telephone Network	7-13
Fig. 7.5	Microwave Transmission Network (Current).....	7-16
Fig. 7.6	OFC Transmission Network ETL In Lao P.D.R.	7-18
Fig. 7.7	LaoTel Internet Connection.....	7-24
Fig. 7.8	Planet Online Internet Connection	7-25
Fig. 7.9	Globenet Internet Connections.....	7-26
Fig. 7.10	Globenet Wireless Internet Access	7-27
Fig. 7.11	Mobile Subscriber Telephone Network (Current).....	7-30
Fig. 7.12	Configuration of Mobile Subscriber Telephone Network (Current)	7-31
Fig. 7.13	Satellite Earth Communications Facility.....	7-33
Fig. 7.14	Planned Period of OFC Transmission Network (Current, undergoing, planning).....	7-36

Fig. 7.15	Voice and Data traffic growth (World)	7-39
Fig. 7.16	Voice and Data traffic growth in Lao P.D.R.	7-40
Fig. 7.17	VoIP and PSTN Traffic	7-41
Fig. 7.18	Type of VoIP	7-42
Fig. 7.19	Network Architecture for 2005	7-49
Fig. 7.20	Network Architecture for the year 2006-2010	7-50
Fig. 7.21	Layered structure IP/ATM/MPLS/SDH	7-50
Fig. 7.22	Network Architecture for the year 2011-2015	7-51
Fig. 7.23	International Gateway	7-52
Fig. 7.24	International Gateway for the Internet	7-53
Fig. 7.25	The Configuration of Switching until 2005	7-58
Fig. 7.26	Switching Expansion Plan until 2010	7-59
Fig. 7.27	Switching Expansion Plan until 2015	7-60
Fig. 7.28	One of possible Future Network Structures for Fixed Telephone services	7-61
Fig. 7.29	System Diagram of SDH Personal Microwave Link	7-64
Fig. 7.30	OFC Transmission Network (2004 - 2005)	7-68
Fig. 7.31	OFC Transmission Network (up to 2010)	7-69
Fig. 7.32	OFC Transmission Network (up to 2015)	7-70
Fig. 7.33	Configuration of Interprovincial Synchronization Network Plan (Reference only)	7-71
Fig. 7.34	Optical Inner City Link - Proposal and Existing Network	7-72
Fig. 7.35	A rapid cost down of current equipment	7-77
Fig. 7.36	Layered platform	7-77
Fig. 7.37	Common IP Network Infrastructure	7-78
Fig. 7.38	IX, DNS and ISPs	7-80
Fig. 7.39	Estimated dial up ports installed	7-83
Fig. 7.40	IP Network Plan (2005)	7-84
Fig. 7.41	IP Network Plan (2010)	7-85
Fig. 7.42	IP Network Plan (2015)	7-86
Fig. 7.43	Typical IP Network structure for City Link	7-87
Fig. 7.44	IP Network structure of 2004-2005	7-88
Fig. 7.45	IP Network configured with ATM/MPLS Switch (2006-2010)	7-89
Fig. 7.46	Typical Mobile Subscriber Telephone System	7-94
Fig. 7.47	Mobile Subscriber Telephone Network up to 2005	7-97
Fig. 7.48	Mobile Subscriber Telephone Network up to 2010	7-98
Fig. 7.49	Mobile Subscriber Telephone Network up to 2015	7-99
Fig. 7.50	Duplicate Access Links and New Additional System of STD-01A	7-100
Fig. 8.1	Rutel Network Configuration	8-2
Fig. 8.2	EPISN Location Map	8-3
Fig. 8.3	The cost of long-distance communications by telephone and bus	8-6
Fig. 8.4	Satisfied demand ratio and telephone density	8-9
Fig. 8.5	Public Telephone Density in 1988 based on ITU	8-10
Fig. 8.6	General View of Rural Telecommunications	8-13
Fig. 9.1	Operation and Maintenance Organizations	9-3
Fig. 9.2	Maintenance Management and Action Procedure	9-8
Fig. 9.3	System Configuration Architecture (Reference only)	9-10
Fig. 9.4	Maintenance Management Computer Networks System	9-11
Fig. 9.5	Typical Route Switch for Main Network Trouble	9-13

Fig. 10.1	Organizatton Chart of TCTI	10-8
Fig. 11.1	Second Scenario (2011-2015).....	11-3
Fig. 11.2	Domestic call charges and GDP per capita (2000)	11-7
Fig. 11.3	Price Change and the Revenue (domestic/fix)	11-8
Fig. 11.4	Price Setting	11-8
Fig. 11.5	Exchange Rate Projection	11-16
Fig. 11.6	Sensitivity Analysis of FIRR on the Change in Revenue.....	11-22
Fig. 11.7	Sensitivity Analysis of FIRR on the mobile phone subscribers	11-23
Fig. 11.8	Sensitivity Analysis of EIRR on the Change in Economic Benefit	11-28

Acronyms and Abbreviations

3G	: 3rd Generation
4G	: 4th Generation
ADB	: Asian Development Bank
ADM	: Add Drop Multiplexer
ADSL	: Asymmetric Digital Subscriber Line
AFTA	: ASEAN Free Trade Area
AOL	: American Online
APT	: Asia-Pacific Telecommunity
ASEAN	: Association of South-East Asian Nations
ATM	: Asynchronous Transfer Mode
ATT	: America Telephone & Telecommunications Corporation
B2B (B to B)	: Business to Business
B2C (B to C)	: Business to Consumer
BHN	: Basic Human Needs
BOT	: Build, Operate, Transfer
BSC	: Base Station Controller
BTS	: Base Transceiver Station
C2G(C to G)	: Citizen to Government
CAPEX	: Capital Expenditure
CCITT	: International Telephone and Telegraph Consultative Committee
CDMA	: Code Division Multiple Access
CIC	: Committee for Investment and Cooperation
C/P	: Counterpart
CSC	: China South-East Asia Cable
DCN	: Data Communication Network
DCTPC	: District officials of the Communication, Transport, Post and Construction
DNS	: Domain Name Systems
DP	: Distribution Points
D-MAS	: Digital Radio Multiple Access Subscriber
DRFM	: Division of Radio Frequency Management
DRAMAS	: Digital Radio Multi-Access Telephone System
DSLAM	: Digital Subscriber Line Access Multiplexer
DT	: Division of Telecommunication
EIRR	: Economic Internal Rate of Return
EPISN	: Extension Program for Immunization Special Network
EPL	: Entreprise des Post Lao
EPTL	: Entreprise des Post and Telecommunications Lao
ETL	: Enterprise of Telecommunications Lao
EU	: European Union
FCC	: Federal Communications Commission
FIRR	: Financial Internal Rate of Return

FOTS	: Fiber Optic Transmission System
G2B (G to B)	: Government to Business
GDP	: Gross Domestic Product
GMS	: Greater Mekong Sub-region
GNE	: Gateway Network Element
GNP	: Gross National Product
GPRS	: General Packet Radio Service
GSM	: Global System Mobile Communication
HF	: High Frequency
HRD	: <i>Human Resource Development</i>
IAI	: Initiative for ASEAN Integration
IC	: Integrated Circuit
ICT	: Information and Communications Technology
IDA	: International Development Association
IDD	: International Direct Dialing
IDR	: Intermediate Data Rate
IEEE	: The Institute of Electrical and Electronic Engineers, Inc.
In G	: Inside Government
IOR	: Indian Ocean Region
IP	: Internet Protocol
IRR	: <i>Internal Rate of Return</i>
ISC	: International Switching Center
ISDN	: Integrated Service Digital Network
ISP	: Internet Service Provider
IT	: Information Technology
ITLS	: International + Transit + Local Switch
ITU	: International Telecommunication Union
ITU-D	: International Telecommunication Union-Telecommunication Development Sector
ITU-T	: International Telecommunication Union-Telecommunication Standardization Sector
IX	: Internet Exchange
JICA	: Japan International Cooperation Agency
LAN	: Local Area Network
LANIC	: Lao National Internet Committee
Lao P.D.R.	: Lao People's Democratic Republic
LAT	: Lao Asian Telecommunications
LDC	: Least Developed Countries
LTC	: Lao Telecommunications Co., Ltd.
MC	: <i>Media Converter</i>
MCTPC	: Ministry of Communication, Transport, Post and Construction
MDF	: Main Distribution Frame
MF	: Medium Frequency
MG	: Media Gateway

MIC	: Ministry of Information and Culture
MIT	: Massachusetts Institute of Technology
MOE	: Ministry of Education
MOI	: Ministry of Interior
MOF	: Ministry of Finance
MOFA	: Ministry of Foreign Affairs
MPLS	: Multi Protocol Label Switching
MPT	: Ministry of Posts and Telecommunications
MSC	: Mobil Switch Center
MSU	: Main Switching Unit
MTBF	: Mean Time Between Failures
MUX	: Multiplex
MW	: Microwave
NII	: National Information Infrastructure
NPO	: Nonprofit Organization
NSC	: National Statistical Center
NTT	: Nippon Telegraph and Telephone Corporation
NUOL	: National University of Lao
O&M	: Operation and Maintenance
OECD	: Organization for Economic Cooperation and Development
OFC	: Optical Fiber Cable
OJT	: On Job Training
OLTE	: Optical Line Transmission Equipment
OMC	: Operation and Maintenance Centre
OPEX	: Operating Expenditure
OSP	: Outside Plant
PC	: Personal Computer
PCB	: Printed Circuit Board
PDH	: Plesiochronous Digital Hierarchy
PIN	: Personal Identification Number
P/J	: Project
POS	: Point of Sales
POT	: Plain Old Telephone
POTS	: Plain Old Telephone Service
PSTN	: Public Switched Telephone Network
PTTC	: Post and Telecommunication Training Center
QoS	: Quality of Service
RSU	: Remote Switching Unit
SDH	: Synchronous Digital Hierarchy
SME	: Small and Medium Enterprises
SMS	: Short Message Service
SPC	: State Planning Committee
SSB	: Single Side Band
STEA	: Science Technology and Environment Agency

STM	: Synchronous Transfer Mode
TCTI	: Transportation and Communication Training Institute
TDMA	: <i>Time Division Multiple Access</i>
TMN	: Telecommunication Management Network
TOT	: Telephone Organization of Thailand
TRX	: Transceiver (Transmitter and Receiver)
UHF	: Ultra High Frequency
UK	: United Kingdom of Great Britain and Northern Ireland
UN	: United Nations
UPS	: Uninterruptible Power System
USA	: United States of America
USAC	: Universal Service Administration Company
VHF	: Very-High Frequency
VoIP	: Voice Over Internet Protocol
VSAT	: Very Small Aperture Terminal
WB	: World Bank
WDM	: Wavelength Division Multiplexing
WTO	: World Trade Organization

EXECUTIVE SUMMARY

Executive Summary

(1) Background of the Study

About 80% of the population of Lao People's Democratic Republic (hereinafter referred to as "Lao P.D.R.") is located in rural areas. The population density is very low at 9 people/km² in rural areas, compared with 134 people/km² in Vientiane. The national average population density is 19 people/km². This low population density is one of the handicaps of the national development plan, which includes the telecommunication development plan.

Telephone density is low, although it has grown to 0.93 telephone lines per subscriber (as of December 2001) as a result of improvement of facilities and human resources by the World Bank, France, Japan, and other donors since the DETECON master plan was prepared by a German consultant in 1989. However, the telephone network is limited to Vientiane and the principal cities. Suitable economic and technical investment plan and telecommunication policies are urgently needed for the international projects such as the Greater Mekong Sub-region (GMS) program directed by ADB and the optical fiber link project between Shanghai-Singapore that passes Lao P.D.R. (China South-East Asia Cable (CSC)).

In order to achieve "Universal Service" and bridge the "Digital Divide", a telecommunication development plan is indispensable. It needs to include a plan for transition to Internet Protocol (IP) networks so that Laotians may enjoy the benefits of information and communications technology (ICT) that come from having a networked society. An expanded telecommunications network for Lao P.D.R. will contribute to the goals of the national economic development policy by invigorating economic activities.

Given the circumstances outlined above, the Government of Lao P.D.R. made a request to the Japanese government in November 2000 to undertake a master plan study on telecommunications development in Lao P.D.R. (hereafter referred to as "the Study"). In response to the request, the Japanese Government charged the Japan International Cooperation Agency (hereafter referred to as "JICA") with responsibility for progressing the Study, and JICA dispatched a preparatory study team to Lao P.D.R. in June 2001. The study team discussed details of the request and the scope of works with the authorities of the Government of Lao P.D.R. In October 2001 the Government of Japan dispatched through JICA a study team and working group to formulate the master plan study on telecommunications development in Lao P.D.R..

(2) Objective of the Study

Specific objectives of the study were to formulate a master plan for telecommunications development in Lao P.D.R. up to the year 2015 and to undertake technology transfer (including methodology and know-how for formulating a master plan) to counterpart personnel of the Department of Post and Telecommunication in the Ministry of Communication, Transport, Post and Construction (MCTPC) and Enterprise of Telecommunications Lao (ETL) in the course of the Study.

The Study was carried out during a period of October 2001 to November 2002 in cooperation with the counterparts from MCTPC and ETL, and accomplished in two (2) study stages; the first-year stage and the second-year stage.

(3) Results of Study

(3-1) Telecommunications Demand Forecast

By two forecast methodologies (macro and micro demand approaches), telecommunications demand forecast were fixed as follows.

The Results of Telecommunication Demand Forecasts in 2005, 2010 and 2015

			2000/2001	2005		2010		2015	
				Low	High	Low	High	Low	High
Fixed-line Subscribers	Macro	Regression	47,887	178,490	194,480	278,460	296,270	415,090	483,340
	Micro	Target Setting	(2000)	184,012 (3.07)		286,287 (4.16)		418,470 (5.56)	
Cellular Mobile Subscribers	Macro	Regression	13,773 (2000)	117,803	128,357	278,460	296,270	622,635	725,010
	Micro	Target Setting	29,545 (2001)	120,209 (2.00)		278,616 (4.05)		662,416 (8.40)	
Total Telephone (Fixed + Mobile)	Macro	Regression		296,293	322,837	556,920	592,540	1,037,725	1,208,350
	Micro	Target Setting	61,660	304,221 (5.07)		564,527 (8.21)		1,100,885 (13.97)	
Internet Subscribers and Hosts with DN	Micro	Proportion of Fixed-lines	Subscribers	18,400		42,900		109,600	
	Micro	Proportion of Fixed-lines	Hosts	761		1,217		2,151	

Note: Number in a parenthesis indicates teledensity in each target year.

Source: JICA Study Team

Calculation results (approximately total one million units in 2015, together with fixed-line and mobile telephone subscribers) obtained both by Macro and Micro approaches are quite large comparing to the present subscriber numbers in Lao P.D.R.. However, considering the recent telecommunication movement in the LDCs, particularly mobile telephone penetration, and historical growth rate of the subscribers in Lao P.D.R., above results do not seem overly exaggerated.

(3-2) Telecommunications Policy

Liberalization is one of the concerned issues of telecommunications policy.

Liberalization and competition of telecommunications sector has been the trend of development in the world in 1990s. Many developed and developing countries have introduced liberalization and competition policy. The policy has developed in such a way that initially introducing competition in long-distance call service market with monopoly of local call service market, then having also competitive local call service market with mobile telephone service providers and now getting into further competitive markets among fixed telephone service by PSTN and mobile telephone service as well as the IP telephone service near future.

It is expected most likely that IP related services must be dominant in the near future before year 2015 even in the Lao P.D.R. The telecommunication policy for liberalization and competition must take this expectation into account, so that telecommunication development in the Lao P.D.R. may go along with socio-economic development and may catch up with ASEAN countries as well as other developing countries.

Types of Liberalization Policy according to ownership of facilities

	Present status	Type A	Type B	Type C	Type D
International	ETL	ETL	LTC ETL	ETL	ISC
Transmission	LTC ETL	ETL	LTC ETL	ETL	LTC ETL
Junction	(LTC) ETL	ETL	LTC ETL	ETL	LTC ETL
Subscribers line	LTC (ETL)	LTC ETL	LTC ETL	LTC/others	LTC ETL
Mobile	LTC (ETL)	LTC/ETL/others	LTC/ETL/others	LTC/others	LTC/ETL/others
Internet	LTC (ETL)	LTC/ETL/others	LTC/ETL/others	LTC/others	LTC/ETL/others

Note: * 0 means historically involved /: free entry for others as well

*The degree of competition may not be necessarily the same.

*ISC is International Switching Center, owned by national authority.

Above Table shows a possible assignment of the telecommunication services between operators. Due to reorganization of ETL and LTC, there is some ambiguity and complexity in assignment at present. In order to accelerate the development of the back-bone network and the telephone services, three types of the service assignment between ETL and LTC may be compared.

Type A shows that ETL will own all facilities and provide all services from international services to local telephone services to the Internet services while LTC will provide international and long-distance call services through ETL facilities. This assignment scheme takes the case, where ETL has a full responsibility to develop the back-bone network. Regarding fairness for competition in terms of service provision from end to end, ETL has more advantageous than LTC, so that

some regulatory measures to guarantee equal-footings for competition must be applied. In order to avoid dual investment of local facilities and human resources, service areas must be geographically separated, say, by province or by region. There will be the allotment problem of service areas, which also concerns cream-skimming to avoid. This case may be better for rural telephone development since the State enterprise ETL will provide the back-bone network.

Type B is the case that ETL and LTC will own all facilities to provide all services from end to end. Therefore equal footing of competitive ETL and LTC is kept, but a waste of dual investment will be expected to be very large, comparing with the market size even at year 2015 or so. Therefore this type is not recommended even though driving forces to lower tariffs may be expected due to competition.

Type C is the case that ETL will provide international and long-distance telephone services while LTC will provide all services with its own local facilities and being rented facilities from ETL. This is some clear cut between roles of ETL and LTC, especially if ETL is limited to own and maintain facilities without providing services, which are supplied by LTC. In order to avoid double investment of human resources as well, this may be alternative choice since the role of ETL is a provision of facilities while LTC and possible other competitive operators are the service provider.

Type D is the case that ETL and LTC will operate under competition while ISC, operated by the national authority, shall provide international switching service to these two operators. This scheme is better to guarantee equal footing for competition, comparing with the present situation where ETL provides the international switching service to LTC. At the same time, this scheme is well suited in order to carry out the one-international-gateway policy.

Liberalizing mobile telephone services and IP related services, Securing to protect privacy and interest of customers were also studied.

(3-3) Network Planning

(1) Network Architecture until 2005

Network architecture for this period is the parallel development of digital switching technology and IP technology. VoIP available in this period is type (a) and (b). IP network should be developed separately with telephone network, however it should be considered for the future expansion and integration with telephone network. The strategic planning is very important.

(2) Network Architecture 2006-2010

Network architecture for this period is the introduction of large capacity ATM/MPLS for common backbone for telephone and IP if additional capacity less

than 155 Mbps is necessary between switches and routers. The important point of this period is that no further development on existing transit switching network shall be made. Instead, if needed, ATM/MPLS systems should be introduced. It should be made good plan for the future integration with the new VoIP type (c) equipment.

(3) Network Architecture 2011-2015

Network architecture for this period is the introduction of large capacity ATM/MPLS for common backbone for telephone and IP if it is necessary. The important point of this period is that no further introduction of existing digital switches is made. Only Routers or ATM/MPLS systems together with IP based RSU or IP based subscriber system (VoIP type (c) equipment) are introduced for the coming IP integration. Also, Fig. 7.22 shows that CATV is also used to access to the Internet. MG (media gateway) will integrate VoIP with the existing telephone system (VoIP type (b)).

(3-4) Human Resource Development

From the point of view of HRD, the estimated employment illustrated in following Table will be divided into two categories, technical and administrative. Based on the data of LTC in 1999, the distribution of the employment to each category is calculated. The results are tabulated as follows.

Estimates of Employment by Category

Year	Description	Technical				Finance, Accounting, Marketing & Administration			Total
		Manager	Engineers	Technician	Workers	Manager	Officers	Workers	
2005	Vientiane Municipality	72	150	365	40	71	292	40	1,030
	Provinces	90	92	407	45	68	142	26	870
	Total	162	242	772	84	139	434	67	1,900
2010	Vientiane Municipality	147	312	758	80	148	606	84	2,135
	Provinces	205	209	918	102	154	318	59	1,965
	Total	352	521	1,676	182	302	924	143	4,100
2015	Vientiane Municipality	206	430	1,047	110	205	837	115	2,950
	Provinces	307	313	1,378	154	231	479	88	2,950
	Total	513	743	2,425	264	436	1,315	204	5,900

Note: Study Team estimates.

In order to catch up the necessary number of human resources, the study team recommended three plans for development as follows.

- (1) Capacity building of MCTPC Staff
- (2) Enhancement of TCTI
- (3) Skill-up Training in ETL/LTC
- (3-5) Financial and Economic Evaluation

The result of the financial and economic evaluation is summarized in the Table below. Due to higher profitability of the mobile phones as explained by the price setting and lower investment cost, inclusion of the mobile phones in the business model relieves the financial constraints. With inclusion of the mobile phones, nearly three quarters of the investment is expected to be covered by earnings. On the other hand, without the mobile phones, only half of the investment is estimated to be covered by earnings unless the charges for the fixed phones are raised higher. From the economic point of view, the proposed telecommunication development is beneficial both with and without mobile phones.

The Result of the Evaluation

	1 st scenario			2 nd scenario		
Assumption	All the proposed plan is to be carried out.			The lower priority projects from 2011 to 2015 are omitted from the first scenario. (Table 11.2 and Fig. 11.1)		
Targeted Subscribers	Fixed	Year	Subscribers	Fixed	Year	Subscribers
		2005	135,164		2005	Same as 1 st Scenario
		2010	278,199		2010	Same as 1 st Scenario
		2015	438,177		2015	427,727
	Mobile	2005	120,210	Mobile	2005	Same as 1 st Scenario
		2010	278,615		2010	Same as 1 st Scenario
		2015	662,410		2015	629,545
	Internet	2005	16,152	Internet	Same as Scenario 1	
		2010	42,409			
		2015	109,614			
CAPEX	Switch	\$54 million		Switch	\$52 million	
	OSP	\$110 million		OSP	\$107 million	
	Transmission	\$91 million		Transmission	\$52 million	
	IP	\$16 million		IP	\$16 million	
	Rural	\$23 million		Rural	\$23 million	
	Subtotal	\$293 million		Subtotal	\$250 million	
	Mobile	\$159 million		Mobile	\$155 million	
	Total	\$452 million		Total	\$405 million	
FIRR	with mobile phones	19.9%		with mobile phones	20.3%	
	without mobile phones	9.3%		without mobile phones	10.2%	
EIRR	with mobile phones	35.5%		with mobile phones	35.8%	
	without mobile phones	21.4%		without mobile phones	22.4%	
Estimated Required Long-term Loan	with mobile phones	\$113 million		with mobile phones	\$111 million	
	(cash shortage until 2007)			(cash shortage until 2007)		
	without mobile phones	\$131 million		without mobile phones	\$113 million	
	(cash shortage until 2011)			(cash shortage until 2010)		

CHAPTER 1
INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 General

This Final Report presents the results of a study conducted from October 2001 to November 2002 in cooperation with the Ministry of Communication, Transport, Post and Construction (MCTPC), Enterprise of Telecommunications Lao (ETL), Lao Telecommunications Co., Ltd. (LTC) and the JICA Study Team (hereinafter referred to as "the Study Team").

1.2 Background of the Study

About 80% of the population of Lao People's Democratic Republic (hereinafter referred to as "Lao P.D.R.") is located in rural areas. The population density is very low at 9 people/km² in rural areas, compared with 134 people/km² in Vientiane. The national average population density is 19 people/km². This low population density is one of the handicaps of the national development plan, which includes the telecommunication development plan.

Telephone density is low, although it has grown to 0.93 telephone lines per subscriber (as of December 2001) as a result of improvement of facilities and human resources by the World Bank, France, Japan, and other donors since the DETECON master plan was prepared by a German consultant in 1989. However, the telephone network is limited to Vientiane and the principal cities. Suitable economic and technical investment plan and telecommunication policies are urgently needed for the international projects such as the Greater Mekong Sub-region (GMS) program directed by ADB and the optical fiber link project between Shanghai-Singapore that passes Lao P.D.R. (China South-East Asia Cable (CSC)).

In order to achieve "Universal Service" and bridge the "Digital Divide", a telecommunication development plan is indispensable. It needs to include a plan for transition to Internet Protocol (IP) networks so that Laotians may enjoy the benefits of information and communications technology (ICT) that come from having a networked society. An expanded telecommunications network for Lao P.D.R. will contribute to the goals of the national economic development policy by invigorating economic activities.

Given the circumstances outlined above, the Government of Lao P.D.R. made a request to the Japanese government in November 2000 to undertake a master plan study on telecommunications development in Lao P.D.R. (hereafter referred to as

“the Study”). In response to the request, the Japanese Government charged the Japan International Cooperation Agency (hereafter referred to as “JICA”) with responsibility for progressing the Study, and JICA dispatched a preparatory study team to Lao P.D.R. in June 2001. The study team discussed details of the request and the scope of works with the authorities of the Government of Lao P.D.R. In October 2001 the Government of Japan dispatched through JICA a study team and working group to formulate the master plan study on telecommunications development in Lao P.D.R.. The Study Team members are shown in Table 1.1. The First-Year Study was completed in March 2002 and the Second-Year Stage Study commenced in May 2002.

1.3 Objectives and Scope of the Study

1.3.1 Objective of the Study

The objectives of the Study were:

- To formulate a master plan for telecommunications development in Lao P.D.R. up to the year 2015.
- To undertake technology transfer (including methodology and know-how for formulating a master plan) to counterpart personnel of the Department of Post and Telecommunication in the Ministry of Communication, Transport, Post and Construction (MCTPC) and Enterprise of Telecommunications Lao (ETL) in the course of the Study.

1.3.2 Study Area

The Study area covers the entire country.

Field Study Areas : Luangphrabang, Vientiane, Savannakhet and Pakse areas

1.3.3 Stages of the Study

In order to achieve the objectives mentioned above, the Study was carried out in two stages over two years covering the following items:

The First-Year Stage (October 2001 to March 2002)	The Second-Year Stage (April 2002 to November 2002)
[A] Preparatory Works in Japan (October 2001)	[D] 1st Study in Japan (Part II) (May 2002 to June 2002)
[B] 1st Site Study (October 2001 to January 2002)	[E] 2nd Site Study (June 2002 to July 2002)
[C] 1st Study in Japan (Part I) (January 2002 to March 2002)	[F] 2nd Study in Japan (July 2002 to September 2002)
	[G] 3rd Site Study (October 2002)
	[H] 3rd Study in Japan (October 2002 to November 2002)

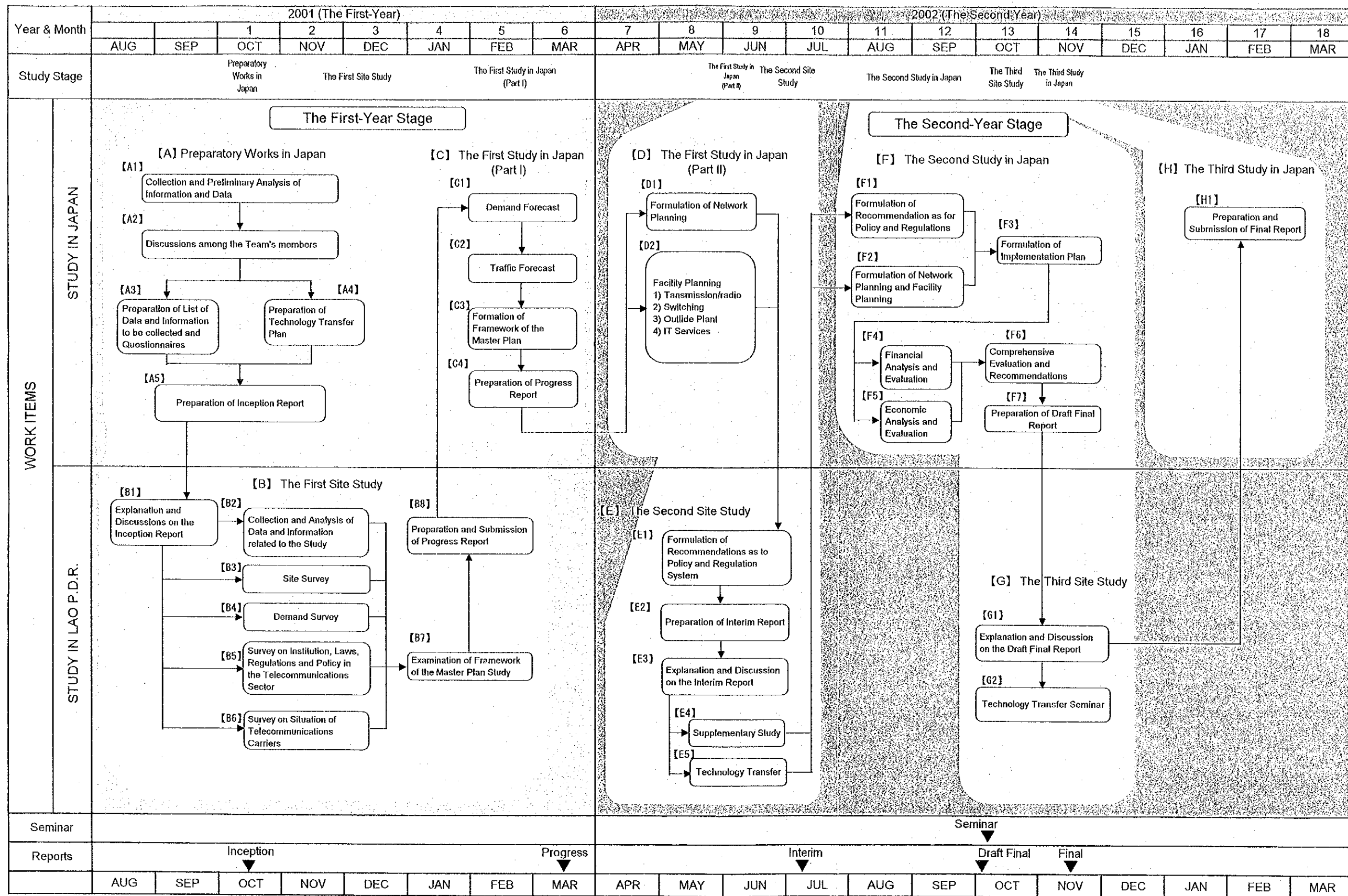


Fig. 1.1 Flow Chart of the Study

1.4 Approaches and Methodology of the Study

1.4.1 Flow of the Study

Figure 1.1 shows the general workflow of the Study.

1.4.2 The First-Year Stage (October 2001 to March 2002)

The following works were conducted in the First-Year Stage.

[A] Preparatory Works in Japan (October 2001)

[A1] Collection and Preliminary Analysis of Information and Data

[A2] Team Discussions

[A3] Preparation of List of Required Data and Information and Design of Questionnaires

[A4] Preparation of the technology Transfer Plan

[A5] Preparation of the Inception Report

[B] 1st Site Study (October 2001 to January 2002)

[B1] Explanation and Discussions on the Inception Report

[B2] Collection and Analysis of Data and Information related to the Study

[B3] Site Survey

Field survey areas were discussed at meetings held to explain the Inception Report. As a result, the following six (6) areas were selected and surveyed by the Study Team.

a) Luangprabang City Area

b) Vientiane Capital Area

c) Savannakhet City Area

d) Pakse City Area

e) Attapeu province (Southern Region)

f) Xiengkhuang province (Northern Region)

[B4] Demand Survey

[B5] Surveys of institution, Laws, Regulations and Policy of the Telecommunications Sector

[B6] Survey on the Situation of Telecommunications Carriers

[B7] Examination of the Framework of the Master Plan Study

[B8] Preparation and Submission of the first Progress Report

The Study Team prepared the first Progress Report based on the results of the First Site Study. The first Progress Report was submitted to and approved by MCTPC/ETL in March 2002.

[C] 1st Study in Japan (Part I) (January 2002 to March 2002)

[C1] Demand Forecast

[C2] Traffic Forecast

[C3] Formulation of Framework of the Master Plan

[C4] Preparation of the second Progress Report

1.4.3 The Second-Year Stage (May 2002 to October 2002)

The following works were carried out in the Second-Year Stage continuing on from First Study in Japan (Part I).

[D] 1st Study in Japan (Part II) (May 2002 to June 2002)

[D1] Formulation of Network Planning

[D2] Facility Planning

- 1) Transmission/radio facility
- 2) Switching facility
- 3) Outside plant facility
- 4) IT services

[E] 2nd Site Study (June 2002 to July 2002)

[E1] Formulation of Recommendations for Policy and Regulations

[E2] Preparation of Interim Report

The Study Team had compiled the Interim Report based on the result of the study carried out in cooperation of MCTPC/ETL.

[E3] Explanation of and Discussion on the Interim Report

[E4] Supplementary Study

After reviewing the results of the First Study in Japan (Part I) and discussion of the Interim Report, the Study Team carried out supplementary study on telecommunications policy, laws and regulations for communication carriers, and facility development.

[E3] Technology Transfer

The Study Team undertook technology transfer on policy and regulations to the counterpart Laotian staff. The Study Team also conducted technology transfer on the following issues:

- 1) Methods of demand and traffic forecast
- 2) Methods for formulation of network planning
- 3) Methods of financial and economic analysis of telecommunications carriers

[F] 2nd Study in Japan (July 2002 to September 2002)

[F1] Formulation of Recommendations for Policy and Regulations

Based on the results of the Second Site Study, the Study Team formulated recommendations for policy, laws and regulations, and institutional arrangements for the telecommunications sector.

[F2] Formulation of Network Planning and Facility Planning

Based on the results of the Second Site Study, the Study Team formulated a network plan (telephone numbering plan, routing plan, switching plan, transmission plan, synchronized plan, signaling plan, tariff plan, configuration of an IP network, transition and co-existing plan of existing network and IP network) and facility construction plan (transmission facility, radio facility, switching facility, transmission line, IT services).

[F3] Formulation of Implementation Plan

The Study Team formulated implementation plans including a plan for transition from a conventional network to an IP network, in accordance with the draft of the Master Plan.

[F4] Financial Analysis and Evaluation

Utilizing estimated project costs and expected income, a cash flow chart was completed. Then, a financial analysis was carried out by calculating the internal rate of return (IRR). In addition, by analyzing change in the factors used to calculate IRR, the Study Team estimated the effect of changes in those factors in future.

[F5] Economic Analysis and Evaluation

The IRR was calculated quantitatively from the social benefits and consumer surplus.

[F6] Comprehensive Evaluation and Recommendations

The Study Team formulated comprehensive evaluation of the planning and recommendations.

[F7] Preparation of Draft Final Report

The Study Team prepared a draft final report and summary compiling the full results of the three stages of the study and incorporating the results of discussions with MCTPC/ETL. The Study Team explained the reports to JICA head office. Following JICA's approval of the reports, the Study Team sent the reports to MCTPC/ETL.

[G] 3rd Site Study (October 2002)

[G1] Explanation and Discussion on the Draft Final Report

The Study Team explained the report and discussed all the results in detail with MCTPC/ETL. The explanation and discussions were recorded in a Minutes of Meeting for confirmation and agreement of both parties on the study results.

[G2] Technology Transfer Seminar

As a result of the study, a technology transfer seminar was held in Vientiane from October 9 to 11. The seminar was attended by about 40 departmental staff and others related to telecommunications development in Lao P.D.R..

[H] 3rd Study in Japan (October 2002 to November 2002)

[H1] Preparation and Submission of the Final Report

The Study Team prepared the final report by revising the draft final report to reflect the comments of MCTPC/ETL.

Upon JICA's approval of the report, the Study Team forward the specified number of copies of the report to the JICA head office.

1.5 Organization of the Study Team

1.5.1 The Study Team and Counterpart Staff

The Director of Telecommunication Division in MCTPC assigned counterpart staff to the JICA Study Team to contribute to the study as shown in Table 1.1. There were nine people from MCTPC/ETL and some were assigned to two or more jobs according to circumstances.

Table 1.1 The JICA Study Team and Working Group assigned by MCTPC

Job Title	JICA Study Team	Counterpart Staffs assigned by MCTPC
1. Team Leader	Dr. Tomotaka TANIGUCHI	Mr. Snith XAPHAJDY (MCTPC)
2. Telecommunications Policy & Regulations	Prof. Tadao YAMAGISHI (replaced from Mr. Takahashi)	Mr. Snith XAPHAJDY (MCTPC) Mr. Chaleun SIBOUNHEUANG (MCTPC)
3. Telecommunications Carriers Regulations	Mr. Kozo IWASO (replaced from Mr. Hirakawa)	Mr. Snith XAPHAJDY (MCTPC) Mr. Chaleun SIBOUNHEUANG (MCTPC)
4. Demand Forecast	Dr. Masafumi TANIFUJI	Mr. Vanthong SOSAMPHANH (ETL) Mr. Somneuk BUAKHAMPHOTHIRATH (ETL)
5. Network Planning	Mr. Yonosuke HARADA	Mr. Vanthong SOSAMPHANH (ETL) Mr. Somneuk BUAKHAMPHOTHIRATH (ETL)
6. Transmission Facilities/Radio Facilities	Mr. Makoto HIRAIWA	Mr. Hongsavanh VONGKHAMSAO (ETL) Mr. Souphalak MANGNOMEK (ETL)
7. Switching System	Mr. Sadao KOSHIKAWA (replaced from Mr. Grubler)	Mr. Sengsonexay KEOVANTHINE (ETL)
8. Transmission Line Planning and Route Selection/Outside Plants	Mr. Izumo HIDAKA	Mr. Hongsavanh VONGKHAMSAO (ETL)
9. IT Services	Mr. Kosei KADA	Mr. Vathana VONGTHEVANH (ETL)
10. Economic and Financial Analysis	Ms. Ayako ISHIWATA	Ms. Mingmala KHIEOVONGPHACHANH(ETL)
11. Business Model Planning for Telecommunications Carriers and Human Resource Development	Mr. Sei-ichi AOKI	Mr. Vanthong SOSAMPHANH (ETL) Mr. Somneuk BUAKHAMPHOTHIRATH (ETL)
12. Coordinator	Mr. Hirotohi AKASAKA	-

1.5.2 JICA Advisory Committee and Other Persons Involved with the Study

The JICA Advisory Committee provided the Study Team with advice for implementing the Study. The members of the committee are listed in Table 1.2. The Study was also supported with the cooperation and assistance of the individuals listed in Table 1.3.

Table 1.2 JICA Advisory Committee

Name	Duty in Charge	Affiliated to
Mr. Takahito MATSUO (replaced from Mr. Takayuki HATAZOE)	Leader / Telecommunications Administration	Deputy Director, International Cooperation Division, International Affairs Department, Telecommunications Bureau, Ministry of Public Management, Home Affairs, Posts and Telecommunications
Mr. Nozomu GODA	Network Planning	Senior Advisor on Information Processing, Institute for International Cooperation, Japan International Cooperation Agency (JICA)

Table 1.3 Other People who Supported the Study

The Lao P.D.R. Side		
Name	Duty in Charge	Affiliated to
Mr. Palami PHOMMATHANSY	Director General of Enterprise des Postes Lao, Telecom Advisor to the Minister of MCTPC	MCTPC
Mr. Somlith PHOUTHONESY	Deputy Director General of Department of Posts and Telecommunications	MCTPC
Mr. Xayleexa IUSISIENGMAY	Assistant Director Telecommunication Division	MCTPC
Mr. Padapphet SAYAKHOT	Director General	ETL
Mr. Khaminouane KOMSIHAPANYA	Deputy Director General	ETL
Mr. Vannaly NORAVONG	Director of Project Division	LTC
Mr. Chanthavone SOSAMPHAN	Deputy Director General of Project Division	LTC
Mr. Chitpasong NOUKEOKAISON	Deputy Director of Project Division	LTC
Mr. Keovisouk SOLAPHOM	Data Planning	LTC
Mr. Takahiko ADACHI	Advisor for Development	JICA Adviser to ETL
Mr. Hiroyasu HAYASHI	Advisor for Telecommunications Development Policy	JICA Adviser to MCTPC

1.6 Schedule of the Study

The overall study schedule is shown in Table 1.4. Following the submission of the Draft Final Report, the Study Team held a technology transfer seminar in Vientiane inviting about 40 trainees, and then prepared this Final Report reflecting the comments on the Draft Final Report by MCTPC/ETL.

Table 1.4 Work Schedule

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			
		2001						2002														
		10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
		Work in Laos		Work in Japan		IC/R		P/R		IT/R		DF/R		F/R								
Study Items																						
Work Schedule	The First-Year Stage	[A] Preparatory Works in Japan																				
		1	Collection and Preliminary Analysis of Information and Data																			
		2	Discussions among the Team's members																			
		3	Preparation of List of Data and Information to be collected and Questionnaires																			
		4	Preparation of Technology Transfer Plan																			
		5	Preparation of Inception Report																			
		[B] The First Site Study																				
		1	Explanation and Discussions on the Inception Report																			
		2	Collection and Analysis of Data and Information related to the Study																			
		3	Site Survey																			
		4	Demand Survey																			
		5	Survey on Institution, Laws, Regulations and Policy of the Telecommunications Sector																			
6	Survey on Situation of Telecommunications Carriers																					
7	Examination of Framework on the Master Plan Study																					
8	Preparation and Submission of Progress Report																					
[C] The First Study in Japan (Part I)																						
1	Demand Forecast																					
2	Traffic Forecast																					
3	Formation of Framework of the Master Plan																					
4	Preparation of Progress Report																					
[D] The First Study in Japan (Part II)																						
1	Formulation of Network Planning																					
2	Facility Planning																					
3	Formulation of Recommendations as to Policy and Regulation System																					
4	Preparation of Interim Report																					
[E] The Second Site Study																						
1	Explanation and Discussion on the Interim Report																					
2	Supplementary Study																					
3	Technology Transfer																					
[F] The Second Study in Japan																						
1	Formulation of Recommendation as for Policy and Regulations																					
2	Formulation of Network Planning and Facility Planning																					
3	Formulation of Implementation Plan																					
4	Economic Analysis and Evaluation																					
5	Financial Analysis and Evaluation																					
6	Comprehensive Evaluation and Recommendations																					
7	Preparation of Draft Final Report																					
[G] The Third Site Study																						
1	Explanation and Discussion on the Draft Final Report																					
2	Technology Transfer Seminar																					
[H] The Third Study in Japan																						
1	Preparation and Submission of Final Report																					
Study Team	Job Title		Name		10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
	1	Team Leader	Tomotaka TANIGUCHI																			
	2	Telecommunications Policy & Regulations	Tadao YAMAGISHI (Hirofumi TAKAHASHI)																			
	3	Telecommunications Carriers Regulations	Kozo IWASO (Teruhide HIRAKAWA)																			
	4	Demand Forecast	Masafumi TANIFUJI																			
	5	Network Planning	Yonosuke HARADA																			
	6	Transmission Facilities/Radio Facilities	Makoto HIRAIWA																			
	7	Switching System	Sadao KOSHIKAWA (Werner GRUBLER)																			
	8	Transmission Line Planning and Route Selection/Outside Plants	Izumo HIDAKA																			
	9	IT Services	Kosei KADA																			
	10	Economic Financial Analysis	Ayako ISHIWATA																			
	11	Business Model Planning for Telecommunications Carriers	Sei-ichi AOKI																			
12	Coordinator	Hirotohi AKASAKA																				

1.7 Technology Transfer

Technology transfer was one of the important tasks of the study team. Through the explanation of reports, seminars and routine works with the counterpart staff on site, the study team has endeavored to transfer the purpose of the study, and the methods for formulation of a master plan on telecommunications development to the MCTPC staff. The methods for demand and traffic forecast, formulation of network planning, financial and economic analyses, and other related techniques, were transferred to ETL staff.