

**CHAPTER 3**  
**ICT DEVELOPMENT**

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## CHAPTER 3 ICT DEVELOPMENT

### 3.1 Present Situation of ICT Development in Lao P.D.R.

“Readiness for the Networked World: A Guide for Developing Countries”<sup>1</sup> is applied to assess current status of ICT development in Lao P.D.R. To develop ICT is to transform the society itself to “Networked Society” in which ICT is accepted, ICT is being used in any where, at any time, and at affordable cost, every layers of ICT engineers and users are educated, ICT related jobs keep created and so forth. The outline of present situation of ICT development in Lao P.D.R.<sup>2</sup> and Vientiane Municipality are as follows;

#### (1) Lao P.D.R. Nationwide

17 indicators out of 19 categories stay at STAGE 1. This shows there is not much ICT development in Lao P.D.R. and the society itself is not ready to use and accept ICT. Insufficient of telecommunications infrastructure including basic telephone service is one of constraints to develop and disseminate ICT nationwide. Also, insufficient of local contents and lack of human resource in every layer in ICT are major constraints to develop ICT furthermore. It takes sometime to develop and disseminate ICT throughout Lao P.D.R. The Fig.3.1 shows status of ICT development in Lao P.D.R.

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<sup>1</sup> “Readiness for the Networked World: A Guide for Developing Countries” by the Center for International Development (CID) at Harvard University is attached to the supporting document.

<sup>2</sup> To distinguish status of ICT development, ICT development in Vientiane Municipality is excluded from the nationwide figure.

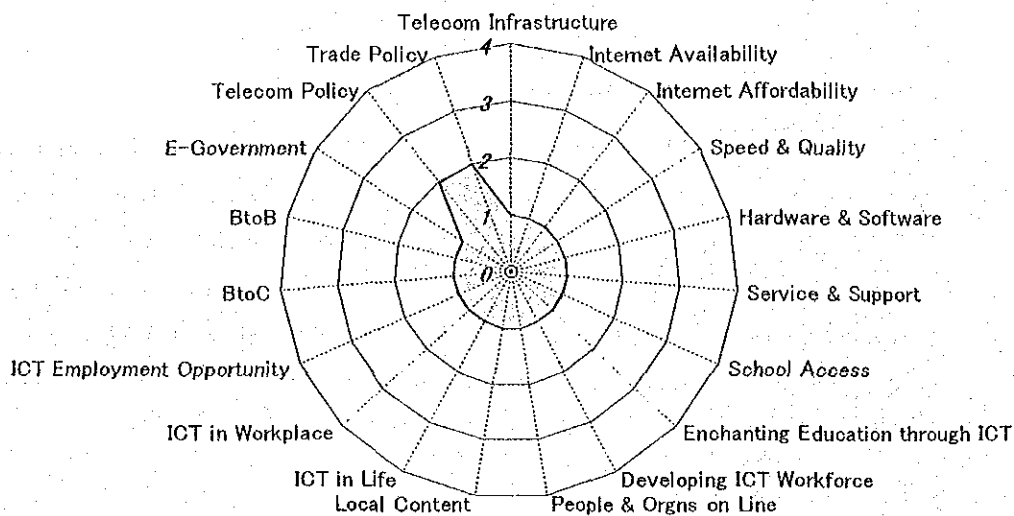


Fig.3.1 Networked Readiness in Lao P.D.R.(without Vientiane Municipality)

(2) Vientiane Municipality

Most of indicators stay at STAGE 2. This shows Vientiane Municipality covers almost of indicators needed for ICT development and is ready to accept and use ICT. Vientiane Municipality is the place to start developing ICT. However, insufficient of local contents and lack of human resource in every layer in ICT are major constraints to develop ICT furthermore. Fig.3.2 shows status of ICT development in Vientiane Municipality.

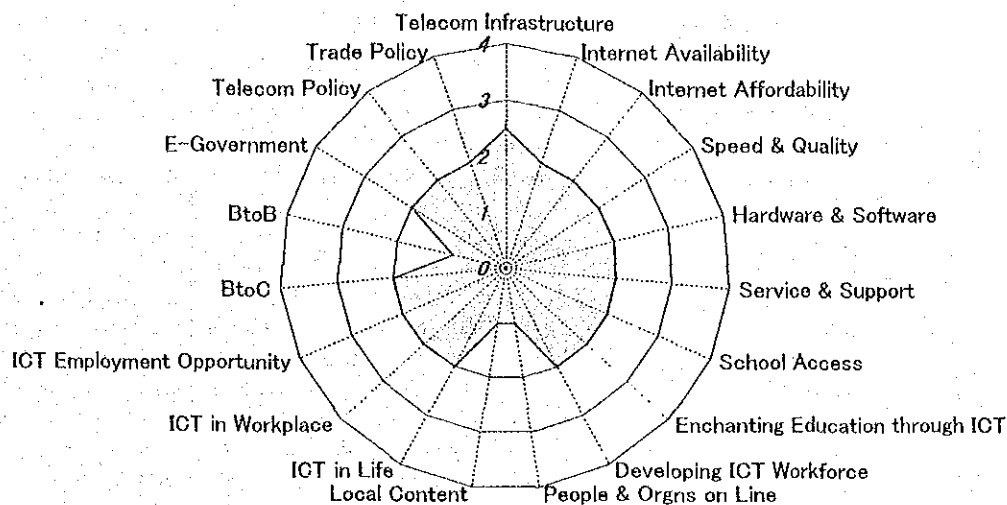


Fig.3.2 Networked Readiness in Vientiane Municipality

### 3.1.1 Constraints to develop ICT in Lao P.D.R.

The followings are constraints to develop ICT in Lao P.D.R.:

- Lack and failure of common sharing of vision and ICT development strategy with priority of telecommunications infrastructure development, multimedia platform development, application and contents development to develop ICT among the Government of Lao P.D.R.
- Lack of Telecommunications Infrastructure
- Society is not ready to accept ICT because of,
  - lack of human resources, low ICT literacy, lack of local contents, un-affordability and un-availability of hardware & software due to low income, and unclear incentive and benefit gain from ICT development.

### 3.1.2 ICT Development Scenario in Lao P.D.R.

Based on telecommunications infrastructure development, ICT development scenario from 2005 to 2015 is formulated and its outline is shown in Table 3.1 Outline of ICT Development in Lao P.D.R.

Table 3.1 Outline of ICT Development in Lao P.D.R

	2005	2010	2015
<b>ICT Development</b>	<p><b>Telecom Infrastructure at STAGE 2</b></p> <p>Teledensity of fixed phone: 2.84 lines per 100 people</p> <p>Penetration rate of mobile phone: 1.94%</p> <p><b>Other indicators:</b></p> <p>Most of indicators are forecasted to reach at STAGE 2. Indicators of People and Organizations on Line, Local Content, B2C, B2B will stay at STAGE 1</p>	<p><b>Telecom Infrastructure</b></p> <p>Reach almost STAGE 3</p> <p>Teledensity of fixed phone: 4.0 lines per 100 people</p> <p>Penetration rate of mobile phone: 3.97 %</p> <p><b>Other indicators:</b></p> <p>Most of indicators are forecasted to exceed STAGE. Indicators of Hardware and Software will reach STAGE 3 because it is expected that hardware such as PC will be affordable and level of income of Laotian will go up. Due to enacting of policy of promotion of SMEs for use ICT and Cyber Law, indicators of People and Organizations on Line, Local Content, BtoC, and BtoB will start increasing at relatively high speed; however, looking for nationwide those indicators are supposed to stay at between STAGE 2 to 3</p>	<p><b>Telecom Infrastructure</b></p> <p>exceed STAGE 3</p> <p>Teledensity of fixed phone: 5.5 lines per 100 people</p> <p>Penetration rate of mobile phone: 5.5 %</p> <p><b>Other indicators:</b></p> <p>Most of indicators are forecasted to exceed STAGE 3. Indicator of People and Organizations on Line, Local Content and B2B will take some time to reach STAGE 3 because it depends on the size of domestic economic activities and numbers of the Internet user. Indicators of Telecommunications Policy and Trade policy expected to reach STAGE 4.</p>
<b>ICT Application</b>	<p><b>e-Government</b></p> <p>expected to be at stage of implementation of pilot project</p> <p><b>e-Education</b></p> <p>Using the City Link in Vientiane, some distant learning pilot project will be implemented.</p> <p><b>Telemedicine</b></p> <p>Medical and health sector is not well-developed to accept telemedicine in 2005. Using the City Link, some pilot telemedicine project will be implemented.</p> <p><b>e-Commerce</b></p> <p>ICT legislation will be established under e-ASEAN framework and Initiative for ASEAN Integration (IAI) by 2005. e-Commerce, especially, Business to Business (BtoB) will start increasing in Vientiane.</p>	<p><b>e-Government</b></p> <p>Some of e-Government application will be implemented nationwide.</p> <p><b>e-Education</b></p> <p>e-Education will be used regularly in Vientiane (some are connected with foreign education institute).</p> <p><b>Telemedicine</b></p> <p>The demand of simple telemedicine application such as tele-consultation and tele-pathology will be appeared in 2010 in Vientiane and other major local cities.</p> <p><b>e-Commerce</b></p> <p>e-Commerce, especially Business to Business (BtoB) will start expand to local cities. BtoC will start to increase.</p>	<p><b>e-Government</b></p> <p>One-stop e-Government services will be available.</p> <p><b>e-Education</b></p> <p>e-Education, especially distance learning will be regularly used at vocational and high school level in Vientiane and other local cities.</p> <p><b>Telemedicine</b></p> <p>The demand of advanced telemedicine application will be appeared in 2015 in Vientiane. The demand of simple telemedicine applications will be appeared in other secondary local cities.</p> <p><b>e-Commerce</b></p> <p>e-Commerce will keep expanding to local cities.</p>

### 3.1.3 Milestone of ICT Development in Telecommunications sector

There will be significant progress in ICT development promoted through the Work Plans in an Initiative for ASEAN Integration (IAI) under the e-ASEAN cooperation framework for CLMV. The Work Plans have formulation of Telecommunications framework, National ICT Master Plans, National Action Plan

for ICT Human Resource Development (HRD), and ICT Legislation, and e-Government from July 2002. Milestone will be considered below;

- Starting point (2004)  
After formulation of National ICT Master Plan, ICT legislation, e-Government, and National ICT Human Resource Development
- Milestone  
Completion of IT related telecommunications project in Vientiane (August, 2004)  
Completion of City Link (2005)  
Introduction of broadband such as ADSL (2004-2005)  
Introduction of IP Network (2007)

### **3.2 Recommended Procedure and Recommendation to develop ICT**

#### **3.2.1 Procedure to develop ICT**

- 1) Set up taskforce specialize in ICT in MCTPC
- 2) Draw up vision and concept of National Information Infrastructure (NII) and formulate ICT Master Plan, ICT legislation, ICT Human Resource Development Plan in cooperation with other ministries.
- 3) Organize Application Committee consist of MCTPC, other ministries including academic and private sector to review contents, applications and multimedia plat form.
- 4) MCTPC will make presentation of this Master Plan to show what kind of application will be implemented when in the Application Committee. MCTPC will arrange seminar for ICT related hardware manufacture, software developer to demonstrate latest ICT products.
- 5) Gather proposals of ICT applications not only from other ministries but also from private sectors for the Application Committee to pre-qualify
- 6) MCTPC will consider request or proposal as opinion from demand side and MCTPC will consider accommodating and improving telecommunications infrastructure and network services.
- 7) MCTPC will coordinate implementation of those proposed ICT applications through the Application Committee.
- 8) To keep monitoring ICT development

3.2.2 Recommendations

- 1) To keep increasing number of telephone lines and the Internet access by giving school and hospital and incentive and priority to install telephone and the Internet access.
- 2) To give incentive ISP to increase and set up access point in Luangpabang, Khammouane, Savanakhet and Champasak
- 3) To promote ICT by demonstration of pilot project in cooperation with ETL and other ministries and governmental agencies to improve ICT literacy for the public (= to create new demand of telecommunications services)

## **CHAPTER 4**

# **TELECOMMUNICATIONS DEMAND FORECAST**



CHAPTER 4 TELECOMMUNICATIONS DEMAND FORECAST

Table 4.1 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)		438,470 (5.56)	
Mobile Subscribers	Macro	Regression	13,773	117,803	128,357	278,460	296,270	622,635	725,010
	Micro	Target Setting	(2000)	120,209 (2.00)		278,616 (4.05)		662,416 (8.40)	
Total Telephone (Fixed + Mobile)	Macro	Regression	61,660	296,293	322,837	556,920	592,540	1,037,725	1,208,350
	Micro	Target Setting		304,221 (5.07)		564,527 (8.21)		1,100,885 (13.97)	
Internet Subscribers and Hosts with DN	Micro	Proportion of Fixed-lines	2,610 (Subscribers)	18,400		42,900		109,600	
	Micro	Proportion of Fixed-lines	Hosts	761		1,217		2,151	
International Call (Outgoing)	Micro: Trend	Plan (10.7 % annual growth rate by phase)	---	5,100,000 calls		7,153,000 calls		10,032,000 calls	

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) 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. (annual growth rate 20.1 % for the fixed telephones and 50.8 % for the mobile telephones from 1996 to 2001), above results do not seem overly exaggerated (refer to “Supporting Report” for detail discussion).

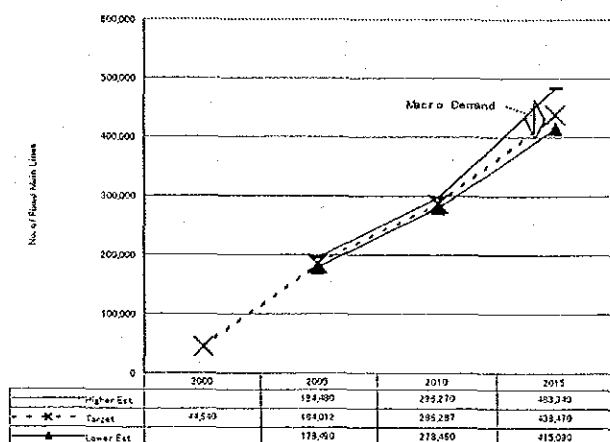


Fig. 4.1 Comparing results of Macro Demand Approach with Micro Demand Approach

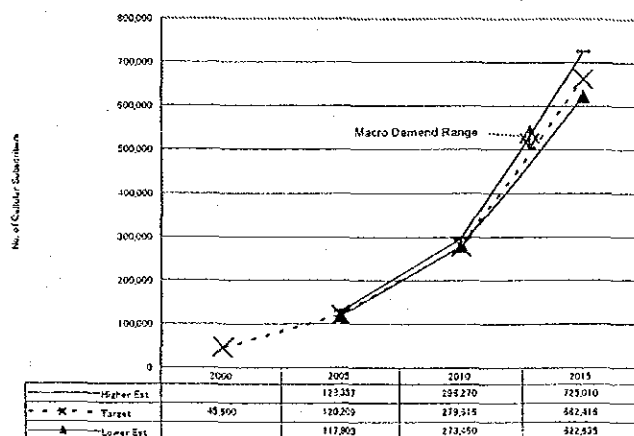


Fig. 4.2 Comparing results of Macro Demand Approach with Micro Demand Approach

Summary

In addition, it should be noted that telecommunications demand studies conducted by DETECON (1990) and ITU (1996) are only for forecasting the fixed telephone lines for Lao P.D.R. Those two studies do include neither the mobile telephone demand nor potential demand for fixed telephones in the country. Thus, the results of total telephone demand at target year (e.g. the year of 2005) in this report could be quite large comparing to the previous telephone demand results due to the above reasons.

Table 4.2 Comparison of Results of Telecommunication Demand Forecasts by Previous Studies and JICA Telecommunications Master Plan Study

		2000/ 2001	2005		2010		Remarks	
Forecast by DETECON Report in 1990 (Fixed Demand only)		44,800 (Forecasted)	89,000 (Forecasted)		182,000 (T.D. 2.4) (Forecasted)		Forecasting of Fixed Telephone Only	
Forecast by ITU Report in 1996 (Fixed Demand only)		51,018 (Forecasted)	101,950 (T.D.1.7) (Forecasted)				Forecasting of Fixed Telephone Only	
Forecast by ITU World Telecommunication Development Report, March 2002 (based on historical growth rates over last four years)		Fixed Telephone Lines	64,000 (T.D.1.00)				Forecasting by Historical Growth Rate over last 4 years	
		Cellular Mobile Subscribers	213,000 (T.D. 3.32)				Forecasting by Historical Growth Rate over last 4 years	
Total Telephone (Fixed + Mobile) by 2002 ITU Forecasting			277,000 (T.D.4.32)					
Lao Telecommunications Development Study Report in 2002 by JICA Study Team								
Estimated GDP per capita (US\$)			Low (\$500)	High (\$550)	Low (\$700)	High (\$750)	Low (\$950)	High (\$1,125)
Fixed main-line Subscribers	By Regression (without Potential Demand)	47,887 (2000) (Actual)	137,300	149,600	214,200	227,900	319,300	371,800
	With Potential Demand: Coefficient Number 1.3	Regression Figure multiplied by 1.3	178,490	194,480	278,460	296,270	415,090	483,340
Mobile Subscribers	Regression (without Potential Demand)	13,773 (2000) 29,545 (2001)	75,300	83,200	123,700	133,100	193,300	231,000
	With Potential Demand		117,803	128,357	278,460	296,270	622,635	725,010
Total Telephone (Fixed + Mobile)	By Regression (without Potential Demand)	61,660 (2000) (Actual)	212,600	232,800	337,900	361,000	512,600	602,800
Total Telephone (Fixed + Mobile)	With Potential Demand	61,660 (2000) (Actual)	296,293	322,837	556,920	592,540	1,037,725	1,208,350

Source: JICA Study Team

**CHAPTER 5**  
**TRAFFIC FORECAST**

## CHAPTER 5 TRAFFIC FORECAST

This chapter covers analyses performed by the team based on the data provided by ETL. Traffic analysis is important for network planning, management and dimensioning. First of all, traffic characteristics for the design are stated. Then, methodology for estimating traffic matrix from the demand forecast is outlined.

### 5.1 Telephone Traffic Characteristics

#### (1) Calling Rate

Calling Rate for outgoing and incoming for fixed telephone and cellular mobile telephone are given in Table 5.1.

Table 5.1 Calling Rate

Fixed telephone	Cellular mobile
0.12	0.02

Source: ETL and Study Team

#### (2) Proportion of International / Transit / Local

The proportion of calls for traffic model is chosen as shown on the Table 5.2.

Table 5.2 Proportion of calls

Local call	Transit call (Long distance)	International call
70%	20%	10%

Source: ETL and Study Team

#### (3) Busy Hour Call Concentration Ratio

The busy hour traffic is concentrated at around 9:00.

### 5.2 Telephone Traffic Estimation (Traffic Matrix for 2005, 2010, and 2015)

The Traffic Matrix for analyzing transit network is estimated by utilizing Gravity model and algorithm shown in Fig. 5.1 are calculated in the following tables. Detail calculation will be given in the supporting documents for reference. The traffic matrix estimated is shown in Table 5.3, 5.4, and 5.5, respectively for 2005, 2010, and 2015.

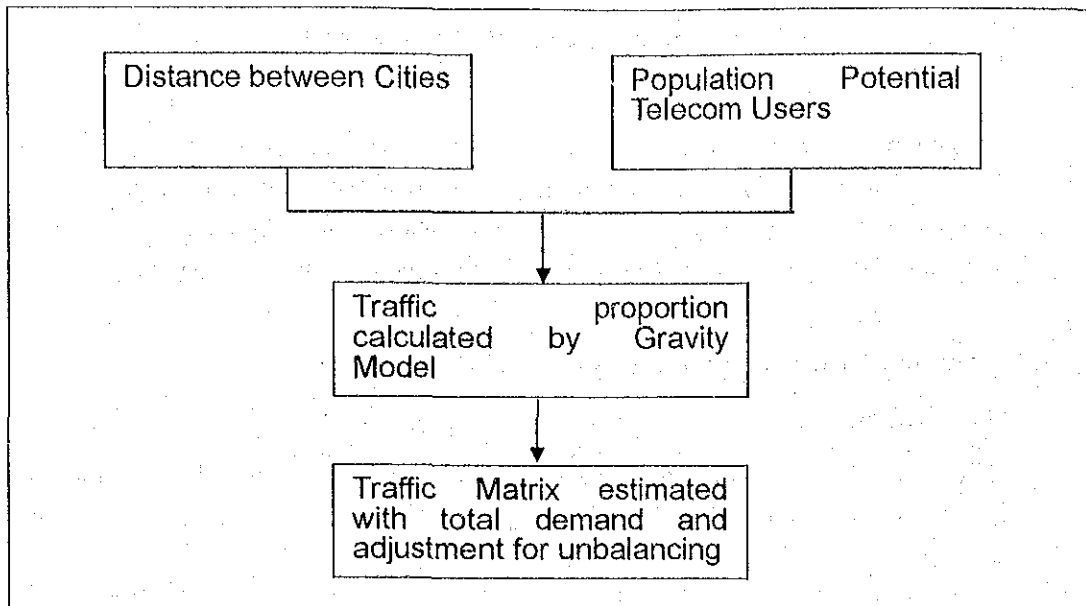


Fig. 5.1 Diagram for estimating traffic matrix

Table 5.3 Fixed Telephone Transit Traffic Matrix for Year 2005

Unit Erlang

	Vientiane muni.	Phongsaly	Luangnamtha	Oudomxay	Bokeo	Luangphabang	Houaphan	Xaiyabouly	Xiengkhuang	Vientiane province.	Bolikhamxay	Khammouane	Savannakhet	Saravane	Sekong	Champasak	Attapeu	Xaysomboun
Vientiane muni.		1.244	3.031	3.812	1.151	32.936	1.875	2.806	12.024	30.240	37.486	36.340	57.889	6.054	1.457	18.812	0.619	0.941
Phongsaly	1.203		2.363	5.444	1.925	0.494	3.743	4.940	3.016	4.139	2.074	3.138	7.367	2.515	0.627	5.116	0.846	0.754
Luangnamtha	2.925	2.281		17.428	7.237	1.307	9.295	12.572	7.462	10.163	4.988	7.457	17.420	5.887	1.468	12.015	1.979	1.839
Oudomxay	3.694	5.275	16.887		6.599	1.897	12.023	16.918	9.601	12.929	6.171	9.085	21.089	7.045	1.755	14.435	2.366	2.318
Bokeo	1.111	1.858	6.984	6.369		0.440	3.428	4.471	2.766	3.812	1.931	2.941	6.922	2.378	0.593	4.828	0.801	0.697
Luangphabang	31.745	0.476	1.260	1.828	0.424		78.197	195.072	89.582	115.958	50.890	72.186	165.137	56.570	13.378	110.972	18.007	20.195
Houaphan	1.819	3.631	9.017	11.664	3.325	75.858		6.372	6.676	6.320	3.061	4.545	10.579	3.708	0.886	7.269	1.195	1.458
Xaiyabouly	2.727	4.801	12.219	16.443	4.345	189.590	6.193		7.353	9.700	4.612	6.574	15.069	5.173	1.225	10.148	1.649	1.712
Xiengkhuang	11.652	2.922	7.231	9.304	2.681	86.810	6.469	7.125		42.276	18.543	26.307	60.206	20.624	4.877	40.458	6.565	12.457
Vientiane province.	29.403	4.025	9.882	12.572	3.707	112.750	6.145	9.432	41.106		31.050	37.291	81.995	26.345	6.091	51.759	8.170	11.253
Bolikhamxay	36.301	2.009	4.830	5.976	1.870	49.282	2.964	4.466	17.957	30.068		97.403	191.209	56.646	12.711	111.529	16.976	13.722
Khammouane	35.366	3.054	7.257	8.842	2.862	70.252	4.423	6.397	25.602	36.292	94.793		471.901	107.158	22.704	211.942	30.092	18.315
Savannakhet	57.313	7.293	17.246	20.879	6.853	163.494	10.474	14.919	59.607	81.179	189.306	467.205		221.909	45.176	440.440	59.592	30.081
Saravane	5.877	2.442	5.716	6.840	2.309	54.923	3.600	5.023	20.024	25.578	54.997	104.038	215.448		12.157	73.167	11.967	3.292
Sekong	1.403	0.604	1.414	1.691	0.571	12.887	0.854	1.180	4.698	5.867	12.245	21.871	43.519	11.711		19.595	4.558	0.795
Champasak	18.458	5.020	11.788	14.163	4.737	108.880	7.132	9.957	39.695	50.783	109.427	207.947	432.137	71.788	19.226		37.134	10.231
Attapeu	0.597	0.816	1.908	2.281	0.772	17.361	1.152	1.589	6.329	7.877	16.367	29.012	57.453	11.538	4.394	35.801		0.342
Xaysomboun	0.906	0.726	1.771	2.232	0.671	19.445	1.404	1.649	11.994	10.835	13.212	17.635	28.963	3.170	0.766	9.851	0.329	
Total	242.501	48.477	120.804	147.767	52.037	998.605	159.372	304.889	365.495	484.019	651.153	1150.973	1884.305	620.218	149.490	1178.135	202.846	130.403

Note: Vertical Axis : Originating Province Center, Horizontal Axis: Terminating Province Center  
Source: Study Team

Table 5.4 Fixed Telephone Transit Traffic Matrix for Year 2010

Unit Erlang

	Vientiane muni.	Phongsaly	Luangnamtha	Oudomxay	Bokeo	Luangphabang	Houaphan	Xaiyabouly	Xiengkhuang	Vientiane province.	Bolikhambay	Khammouane	Savannakhet	Saravane	Sekong	Champasak	Attapeu	Xaysomboun
Vientiane muni.		5.739	11.081	14.171	5.307	75.776	6.812	11.404	19.341	74.692	56.988	66.594	123.942	13.985	5.988	76.203	2.598	9.100
Phongsaly	5.516		7.276	16.764	5.929	1.521	11.527	15.212	9.291	12.748	6.392	9.669	22.694	7.746	1.931	15.737	2.607	2.321
Luangnamtha	10.656	6.997		42.555	17.671	3.192	22.698	30.698	18.229	24.819	12.187	18.219	42.551	14.378	3.584	29.304	4.834	4.490
Oudomxay	13.630	16.124	40.928		16.381	4.710	29.850	41.999	23.845	32.100	15.328	22.567	52.373	17.492	4.358	35.793	5.874	5.755
Bokeo	5.102	5.700	16.987	15.747		1.354	10.557	13.770	8.523	11.741	5.952	9.062	21.326	7.324	1.827	14.851	2.466	2.145
Luangphabang	73.135	1.468	3.081	4.546	1.307		120.134	299.672	137.670	178.150	78.230	110.959	253.782	86.917	20.552	170.280	27.666	31.024
Houaphan	6.549	11.081	21.819	28.694	10.148	115.483		15.460	16.203	15.335	7.431	11.032	25.676	8.998	2.150	17.617	2.899	3.538
Xaiyabouly	10.965	14.626	29.516	40.382	13.240	288.133	14.865		19.962	26.326	12.524	17.849	40.910	14.041	3.323	27.507	4.474	4.647
Xiengkhuang	18.604	8.936	17.534	22.936	8.199	132.424	15.585	19.201		45.396	19.924	28.263	64.669	22.148	5.237	43.391	7.050	13.376
Vientiane province.	71.899	12.271	23.891	30.900	11.302	171.489	14.762	25.342	43.699		51.243	61.540	135.283	43.456	10.046	85.266	13.476	18.560
Bolikhambay	54.869	6.154	11.734	14.758	5.730	75.321	7.154	12.058	19.183	49.338		98.876	194.059	57.477	12.897	113.019	17.225	13.921
Khammouane	64.226	9.325	17.571	21.764	8.740	107.012	10.640	17.215	27.258	59.351	95.359		577.364	131.076	27.769	258.912	36.807	22.400
Savannakhet	120.047	21.981	41.214	50.727	20.656	245.805	24.869	39.624	62.636	131.031	187.960	559.217		317.198	64.569	628.754	85.179	42.991
Saravane	13.451	7.451	13.829	16.824	7.045	83.600	8.655	13.506	21.303	41.798	55.284	126.075	305.096		18.751	112.725	18.461	5.078
Sekong	5.756	1.857	3.445	4.189	1.756	19.756	2.067	3.195	5.034	9.657	12.397	26.694	62.069	18.025		53.718	12.511	2.183
Champasak	73.656	15.211	28.324	34.597	14.354	164.588	17.028	26.588	41.940	82.416	109.241	250.257	607.735	108.957	51.923		100.572	27.706
Attapeu	2.497	2.505	4.645	5.645	2.370	26.587	2.786	4.300	6.775	12.951	16.553	35.371	81.857	17.741	12.023	96.650		0.959
Xaysomboun	8.747	2.231	4.316	5.532	2.062	29.820	3.401	4.466	12.857	17.840	13.381	21.531	41.323	4.881	2.098	26.632	0.922	
Total	559.305	149.657	297.192	370.731	152.199	1546.573	323.391	593.709	493.749	825.690	756.375	1473.776	2652.711	891.840	249.025	1806.359	345.622	210.194

Note: Vertical Axis : Originating Province Center, Horizontal Axis: Terminating Province Center  
Source: Study Team

Table 5.5 Fixed Telephone Transit Traffic Matrix for Year 2015

Unit Erlang

	Vientiane muni.	Phongsaly	Luangnamtha	Oudomxay	Bokeo	Luangphabang	Houaphan	Xaiyabouly	Xiengkhuang	Vientiane province.	Bolikhamxay	Khammouane	Savannakhet	Saravane	Sekong	Champasak	Attapeu	Xaysomboun
Vientiane muni.		17.706	31.389	44.837	13.922	137.842	25.138	33.756	34.206	192.409	77.311	122.137	254.986	33.173	15.500	157.297	9.771	28.110
Phongsaly	17.026		15.674	36.112	12.776	3.278	24.834	32.772	20.020	27.460	13.777	20.835	48.881	16.690	4.162	33.899	5.617	5.001
Luangnamtha	30.199	15.080		84.160	34.958	6.316	44.895	60.720	36.065	49.084	24.118	36.046	84.146	28.441	7.089	57.955	9.562	8.882
Oudomxay	43.155	34.757	81.003		36.201	10.409	65.953	92.802	52.700	70.918	33.887	49.875	115.697	38.652	9.630	79.079	12.982	12.717
Bokeo	13.386	12.283	33.610	34.805		2.480	19.335	25.220	15.615	21.502	10.906	16.602	39.051	13.415	3.346	27.196	4.517	3.929
Luangphabang	133.028	3.163	6.095	10.046	2.393		152.551	380.550	174.868	226.197	99.393	140.939	322.201	110.382	26.101	216.210	35.137	39.400
Houaphan	24.178	23.885	43.179	63.433	18.596	146.721		39.837	41.760	39.509	19.157	28.435	66.146	23.188	5.541	45.388	7.471	9.118
Xaiyabouly	32.470	31.524	58.408	89.268	24.259	366.059	38.320		41.269	54.405	25.898	36.901	84.537	29.024	6.870	56.847	9.249	9.605
Xiengkhuang	32.901	19.256	34.689	50.689	15.019	168.196	40.167	39.694		56.039	24.610	34.903	79.824	27.346	6.466	53.565	8.705	16.515
Vientiane province.	185.353	26.453	47.284	68.317	20.713	217.903	38.060	52.410	53.984		92.235	110.740	243.326	78.184	18.075	153.379	24.247	33.393
Bolikhamxay	74.394	13.257	23.208	32.608	10.495	95.643	18.434	24.921	23.682	88.755		93.640	183.698	54.424	12.212	106.996	16.311	13.182
Khammouane	117.789	20.094	34.763	48.100	16.011	135.921	27.422	35.588	33.660	106.798	90.306		739.073	167.837	35.559	331.463	47.131	28.683
Savannakhet	247.196	47.388	81.576	112.162	37.858	312.358	64.126	81.954	77.385	235.892	178.085	716.493		455.810	92.789	903.339	122.405	61.778
Saravane	31.917	16.058	27.364	37.189	12.908	106.203	22.310	27.925	26.311	75.225	52.364	161.484	438.556		31.060	186.677	30.579	8.410
Sekong	14.903	4.001	6.816	9.259	3.218	25.096	5.327	6.605	6.217	17.379	11.742	34.189	89.215	29.864		97.076	22.615	3.946
Champasak	152.145	32.789	56.056	76.489	26.305	209.128	43.902	54.985	51.810	148.355	103.491	320.606	873.750	180.562	93.896		144.995	39.943
Attapeu	9.392	5.399	9.191	12.478	4.342	33.774	7.181	8.890	8.367	23.307	15.678	45.304	117.659	29.393	21.738	139.374		2.518
Xaysomboun	27.028	4.809	8.540	12.227	3.778	37.882	8.767	9.235	15.879	32.107	12.674	27.578	59.399	8.087	3.794	38.405	2.422	
Total	1186.460	327.903	598.847	822.181	293.751	2015.211	646.723	1007.865	713.799	1465.341	885.632	1996.706	3840.146	1324.472	393.829	2684.144	513.714	325.131

Note Vertical Axis : Originating Province Center, Horizontal Axis: Terminating Province Center  
Source: Study Team



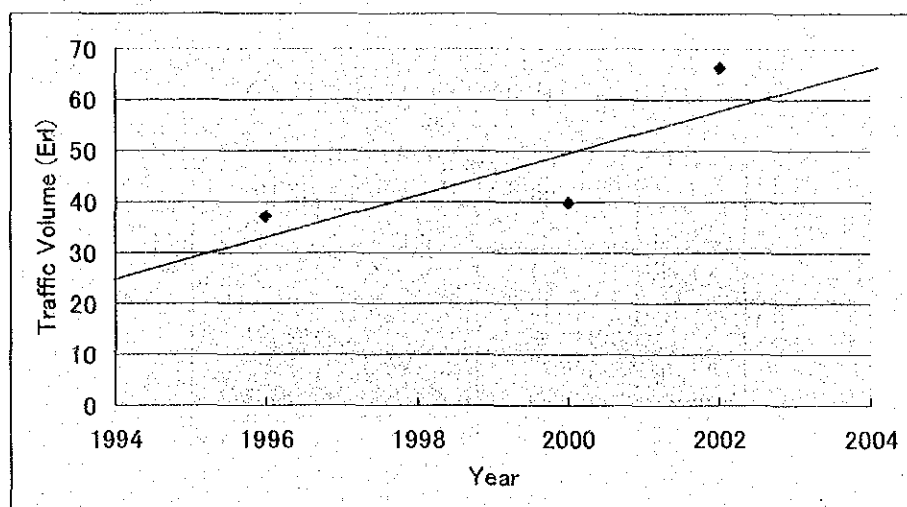
### 5.3 International Telephone Traffic

International telephone traffic is increasing during the observation by the Study Team, and C/P.

**Table 5.6 International Telephone Traffic (outgoing traffic)**

1996	2000	2002
37.15	39.89	66.34

Source: Traffic measurement in 2002 was carried out by the team and C/P, measurement data of 1996 and 2000 are provided by Lao side.



**Fig. 5.2 International Telephone Traffic (outgoing traffic)**

Source: Traffic measurement in 2002 was carried out by the team and C/P, measurement data of 1996 and 2000 are provided by Lao side

For estimation of the outgoing traffic, the Study Team estimates the number of total calls on target year first from the target demand stated in chapter 4. Calculation is made based on ITU E-506. The average holding time for each destination is used. The traffic and number of calls are calculated for 2005, 2010, and 2015 shown in Table 5.7 and Table 5.8. Also, the traffic for each destination is also calculated shown in Table 5.9.

From the traffic analyses, the Study Team strongly suggests early introduction of International Switch by 2005.

**Table 5.7 Estimated International Traffic**

Unit :crf

	Outgoing	Incoming	Total
1998	172	158	330
1999	185	171	356
2000	195	188	384
2005	490	473	962
2010	796	768	1,565
2015	1,317	1,271	2,588

Source: Study Team

**Table 5.8 Estimated International Calls**

Unit :k calls

	Outgoing	Incoming	Total
1998	2,793	2,559	5,352
1999	3,007	2,766	5,773
2000	3,168	3,057	6,225
2005	16,550	15,971	32,521
2010	26,909	25,966	52,874
2015	44,512	42,952	87,464

Source: Study Team

Table 5.9 International Traffic Estimation

Country	Unit Erlang					
	Traffic 2005		Traffic 2010		Traffic 2015	
	Outgoing	Incoming	Outgoing	Incoming	Outgoing	Incoming
Australia	9.23	8.90	15.00	14.47	24.81	23.94
China	9.64	9.30	15.67	15.12	25.92	25.01
Germany	14.66	14.15	23.84	23.01	39.44	38.06
Hong Kong	1.51	1.46	2.45	2.37	4.06	3.92
Japan	8.02	7.73	13.03	12.58	21.56	20.80
Singapore	3.32	3.20	5.39	5.20	8.92	8.61
South Korea	2.36	2.28	3.84	3.70	6.35	6.13
Taiwan	2.18	2.11	3.55	3.43	5.87	5.67
Thailand	153.28	147.91	249.21	240.48	412.24	397.80
Vietnam	36.44	35.16	59.24	57.17	98.00	94.56
<b>Total</b>	<b>240.63</b>	<b>232.20</b>	<b>391.23</b>	<b>377.52</b>	<b>647.17</b>	<b>624.50</b>

Source Study Team

**CHAPTER 6**  
**TELECOMMUNICATIONS POLICY,  
LAWS AND REGULATION**

## CHAPTER 6 TELECOMMUNICATIONS POLICY, LAWS AND REGULATION

- (1) As the information society has come in the world, telecommunications and computers are put together so as to have the ICT revolution. While Lao P.D.R. is still far behind telephone development with the telephone density of only about 0.8 telephones per 100 inhabitants in 2000, new advanced ICT technologies such as IP network shall be introduced into the country.
- (2) Lao P.D.R. is one of least developed country with the population of only 5 million or so in 2000. The country is a member of the ASEAN, and its economy is at the transitory towards the market-oriented economy under the policy of New Economic Mechanism.
- (3) Based on those socioeconomic conditions of Lao P.D.R. and the development course of telecommunications in the world, the telecommunications development plan for Lao P.D.R. must consider seriously the following three major objectives:
  - a) To improve telecommunications services including both mobile and fixed telephone services and the IP related services
  - b) To provide the telephone service in rural areas where more than 85% of population lives
  - c) To introduce IP technology into the country smoothly and take a full advantage of it for establishing the information society in the 21st century
- (4) Aims and roles of telecommunications policy have been changing as socioeconomic situation has developed as well as telecommunication technology has been changing so rapidly. And those of the policy may differ among countries, depending on their socioeconomic, geographical, and political conditions as well.

Today, the information society is with us, which may yield some common issues for policy making on the one hand but may provide opportunity to make different information-communication policy on the other hand. Telecommunication policy must be an important part of information-communication policy.

Three important aims of telecommunication policy will be discussed below, namely, consumer protection, contribution to socioeconomic development, and national security. National security may be not much so critical in developed countries but is essential for least developed countries like Lao P.D.R..

(5) Policy

The telecommunications policy must be formulated and designed to achieve those objectives with the following major policy measures:

- a) To liberalize mobile telephone service and IP related services
- b) To have both ETL and LTC to provide fixed telephone service by avoiding any loss of double investment
- c) To rebalance the tariff structure of telecommunications services
- d) To establish the procedures for interconnection negotiation, settlement of business conflicts and hearings of user complaints
- e) To develop the comprehensive legal system
- f) To define rules and regulations so as to keep accountability, transparency and fairness

(6) Law

The telecommunications related law in Lao P.D.R. is only TELECOMMUNICATIONS ACT enacted on the 10<sup>th</sup> of April in 2001. However, the Radio Act and Telecommunications Business Act to supplement such fundamental law shall be enacted for the implementation of the terms of TELECOMMUNICATIONS ACT. The former is the basic law for wireless telecommunications and the latter will regulate the telecommunications service operation. The laws needed for now in Lao P.D.R. are Radio Act on the radio frequency usage and radio station administration, and Telecommunications Business Act that defines roles and obligations of ETL, LTC and other telecommunications operators.

(7) Regulation

The laws define the fundamental rule governing the duties of government and also the rights and obligations of people. To comply with the changing socio-economic conditions, the detailed items which are expressed under the spirit of each law the will be governed by regulations. In Lao P.D.R., experienced and capable personnel are scarce in telecommunications area, and the functional division for policy making and regulation cannot accommodate adequate number of officers and will result in less efficiency. Therefore, the policy making and regulatory functions shall be kept in the MCTPC for while. After recruiting enough number of capable officers, Lao P.D.R. will follow the world trends in future.

Under liberalization of telecommunications sector, the following four regulations are major regulations to practice.

- a) Telecommunications Business Regulation
- b) Tariff Regulation

- c) Interconnection Regulation
- d) *Licensing of spectrum usage*

Besides the above, universal service fund for supporting rural telephone development shall be also well defined so as to implement effectively.

**CHAPTER 7**  
**NETWORK DEVELOPMENT PLANNING**



CHAPTER 7 NETWORK DEVELOPMENT PLANNING

7.1 Current Network

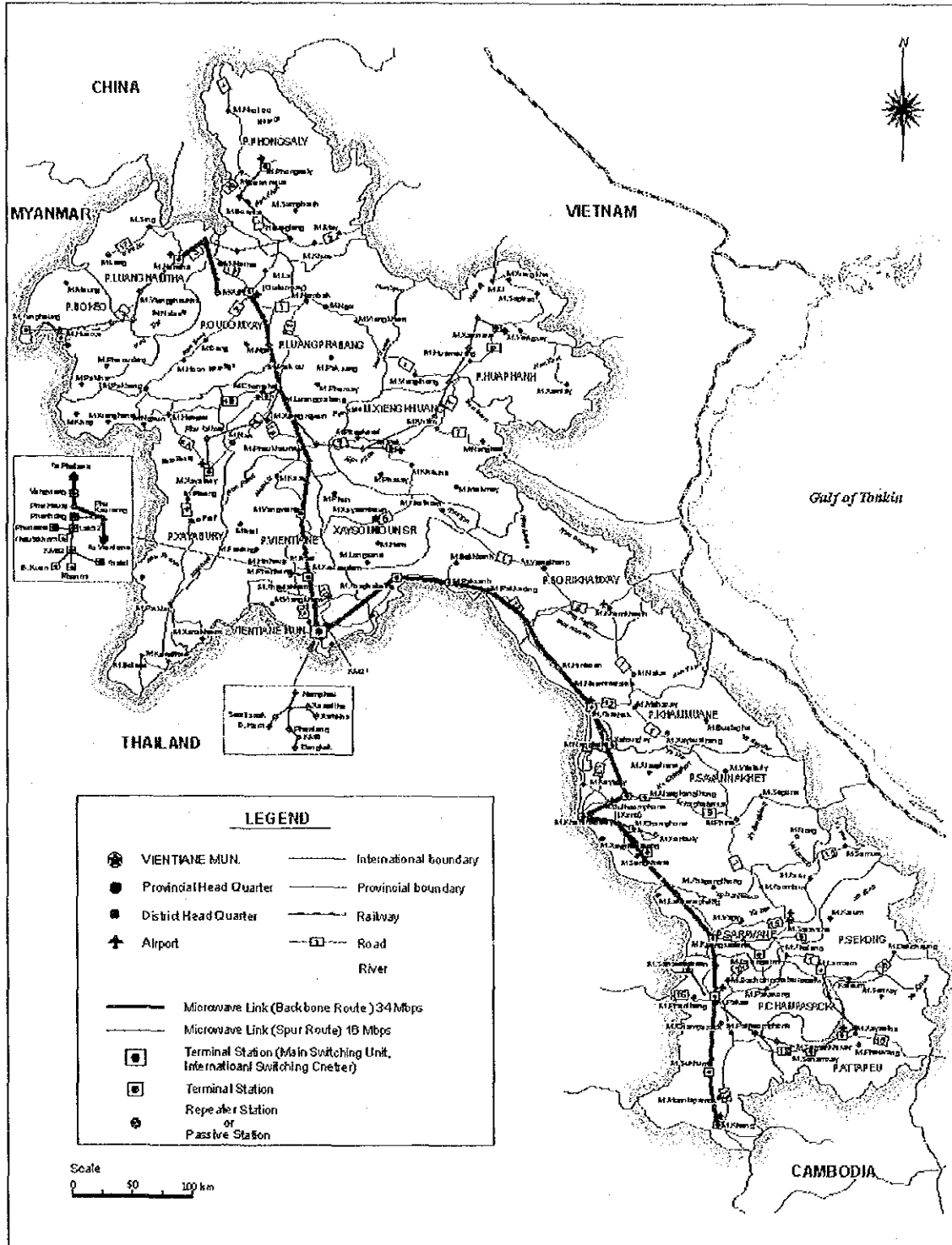


Fig. 7.1 Microwave Transmission Network (Current)

Telecommunication Network of Lao P.D.R. is configured with the microwave backbone and digital switching systems (Refer to Fig. 7.1). The telecommunication service is provided by two operators, ETL and LTC. The study team surveyed the telecommunication network in October 2001 and proposed the future network based on the current network condition and future expansions to meet the future growing demand and new services such as the ICT and the Internet. Detail survey is given in the main document, supporting and data books.

## **7.2 Current status of the network services in Lao P.D.R.**

### **(1) PSTN services**

- Basic service
- International telephone services
- IXY service
- Public telephone service
- FAX service
- Pre-paid card phone services
- Operator, directory and guidance service
- Intelligent network service

### **(2) Cellular Mobile Phone Service**

- Interconnection with the fixed telephone (LTC and ETL).
- Roaming service
- Data service over the mobile cellular phone

### **(3) Internet**

### **(4) Leased line service**

### **(5) Data communication service**

### 7.3 Transition to the IP integrated Network

#### (1) World Trend for the IP network

At present, a switchover from the circuit switched network to the IP packet based network is occurring and the network is going to be integrated by IP protocols in the world. It should be assessed an impact of the IP network, transition to and integration is meaningful in Lao P.D.R.

For Lao P.D.R., it is estimated in 2012 when IP traffic exceeds telephone traffic as shown in the Fig. 7.2. For the development of the future Internet and the development of ICT, this should be taken into consideration.

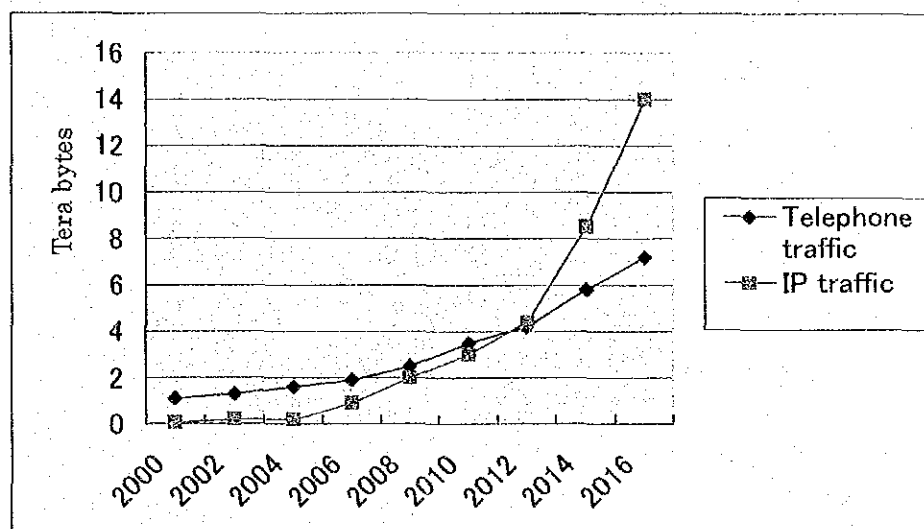


Fig. 7.2 Voice and Data traffic growth in Lao P.D.R.

Source : Study Team (estimated from demand forecast)

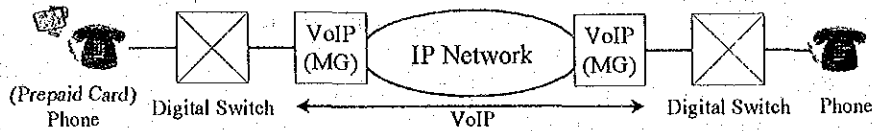
#### (2) The problem of the manufactures

Most of all the telecommunication equipment manufacturers except few in the world have withdrawn from producing the Digital Switching System. They are focusing for the production of the cellular mobile and IP equipment. This may cause problem for telecom operators to procure additional equipment and purchase maintenance parts in the future. Once introduced, the telecom operator should utilize equipment for more than 10 to 15 years.

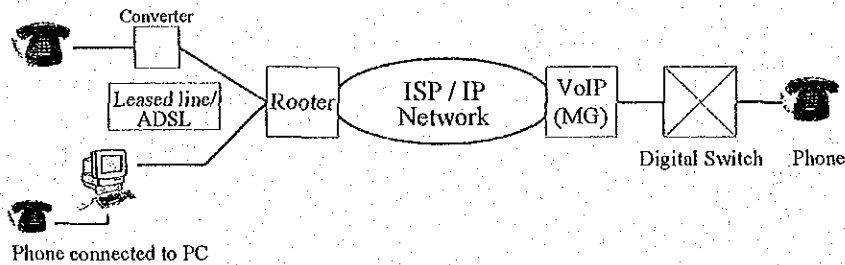
(3) Introduction of VoIP

VoIP are used for voice communications in three types; (a) transit calls, (b) calls from ISP to fixed line network, and (c) IP switching systems. In 2002, (a) and (b) are used for the communication, however, (c) are only available for office use and large carrier class switch is under development by manufactures.

(a) Transit / International



(b) IP Network to PSTN



(c) IP Switching System

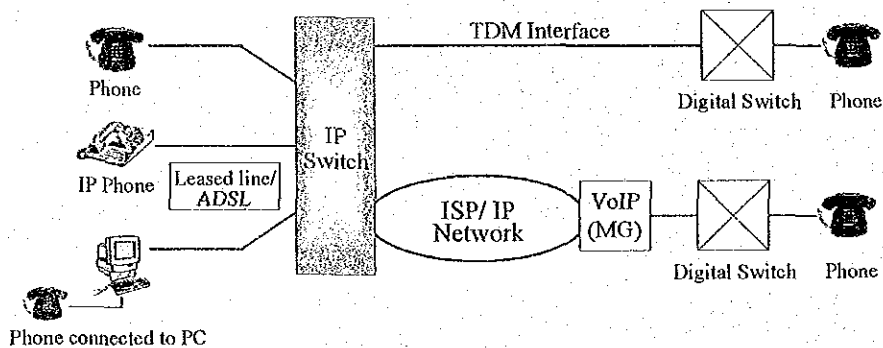


Fig. 7.3 Type of VoIP

Source: Study Team

(4) Integration to the IP network

As for the advantage of Shanghai Bell MSU, it is reasonable to introduce MSU and extend it with RSU if the capacity of lines is large and installation cost is economically.

It is also considered that ICT developments become more actively in Lao after 2005, and IP infrastructure becomes indispensable. Therefore, investment to IP network will be the key to the future. After 2005, it should be better to cope with existing telephone manufactures whether they continues or deduce production toward 2010. In the year 2005, only few manufactures remain in the digital switching market with less competition, in consequence, the price may increase.

It is recommended that introduction to VoIP will be from 2010 when IP infrastructure is able to handle VoIP. Also, it should be checked and evaluated the available technology, level of the quality of service and the status of manufactures at every 2005, 2010 and 2015.

From 2005 to 2010, transit traffic will be growing rapidly and new transit switching systems may become necessary. In such case, the Study Team recommends that ATM/MPLS system that is able to integrate both circuit switching and IP routing should be introduce instead of MSU. ATM/MPLS system can be used after all MSU has been replaced.

#### 7.4 Numbering Plan

The team proposes the reform of numbering plan for the concept and actual proposal shown in Table 7.3.

The Study Team allocated in the followings;

- ◆ The numbering structure are the same structure for fixed and cellular mobile
- ◆ Allocation are made for Vientiane and adjacent areas for "2X", southern parts for "3X", and northern parts for "4X" in order to the people to remember easily.
- ◆ Expansion is available for Vientiane from "22" to "2" for future 3 digit local prefix.
- ◆ Large cities (Luangprabang, Savannakhet, and Pakse) are allocated two adjacent numbering pools.
- ◆ Reallocation is easier when the number of subscriber is small than in 2015 when the total subscriber exceeds one million.
- ◆ VoIP numbering
  - VoIP type (c): IP switches are interconnected to the existing PSTN and

therefore same numbering scheme is applied. Toll prefix should be assigned different way such as to allocate opposite direction from the end.

- VoIP type (b): "050" is allocated for the users form computer connecting through IP network.

The number of fixed telephone for Vientiane will be in short. Like most of large cities in the world, prefix number may change to 3 digits from current 2.

(1) Current Numbering Plan for 1XY

Allocation of 1XY numbers to each ISP may eventually reduce the numbers available in the future with the increase of ISPs. 4 digit special numbers such as 8888 should allocate it.

(2) MCTPC role

The MCTPC should control the whole numbering structure. If a telecom operator needs new numbers, they request with the MCTPC, and the MCTPC shall assign the prefix and range of the numbers. If the telecom operator needs further reassignment of the numbers, all the arbitration shall be carried out by the MCTPC. The MCTPC will introduce additional numbering scheme such as VoIP numbers, and international settlement of numbers, if necessary.

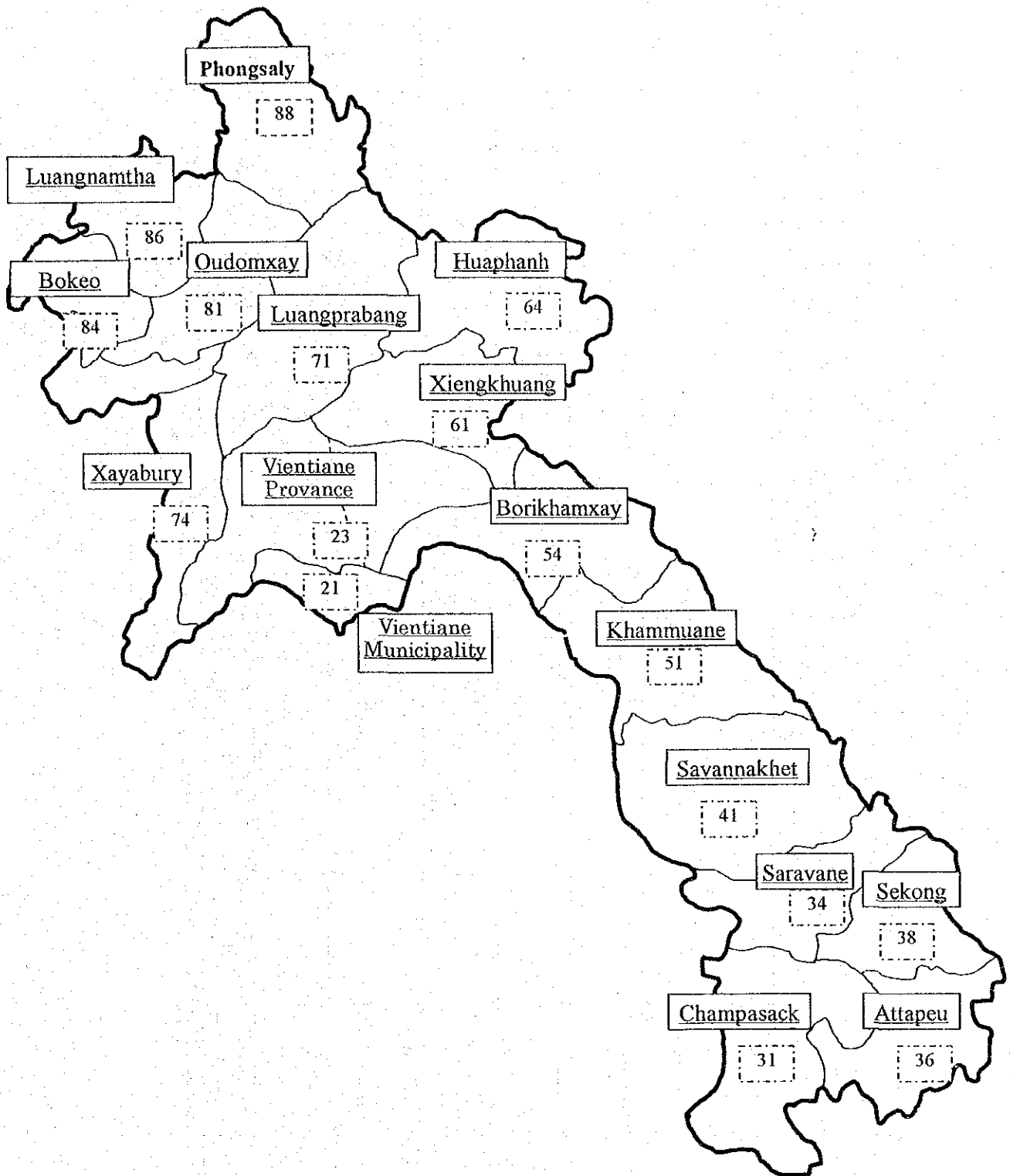


Fig. 7.4 Numbering Plan in the LAO P.D.R.

Source: MCTPC.

Table 7.1 Current Numbering Plan in Lao P.D.R.

AB	0	1	2	3	4	5	6	7	8	9
0										
1										
2	Current GSM	Vientiane Municipality Area		Vientiane Province Area						
3		Champasack Area			Saravane Area		Attapeu Area		Sekong Area	
4		Savannakhet Area								
5		Khammuane Area			Borikhamxay Area					
6		Xiengkhuang Area			Huaphanh Area					
7		Luangprabang Area			Xayabury Area					
8		Oudomxay Area			Bokeo Area		Luangnamtha Area		Phonsaly Area	
9										

Source: Original table is provided by MCTPC and 030, 050, 080 are given by the team



Table 7.2 Possible Future Numbering Plan for Lao P.D.R. detail allocation example

AB	0	1	2	3	4	5	6	7	8	9	
0											
1											
2	Fixed Telephone		Vientiane Municipality Area						Vientiane Province Area	Special Zone	
3		Champasack Area		Saravane Area	Attapeu Area	Sekong Area	Savannakhet Area		Khammuane Area	Borikhamxay Area	
4		Xiengkhuang Area	Huaphanh Area	Luangprabang Area		Xayabury Area	Oudomxay Area	Bokeo Area	Luangnamtha Area	Phonsaly Area	
5		IP Telephony for future use									
6	Mobile Telephone		Vientiane Municipality Area						Vientiane Province Area	Special Zone	
7		Champasack Area		Saravane Area	Attapeu Area	Sekong Area	Savannakhet Area		Khammuane Area	Borikhamxay Area	
8		Free phone for future use	Xiengkhuang Area	Huaphanh Area	Luangprabang Area		Xayabury Area	Oudomxay Area	Bokeo Area	Luangnamtha Area	Phonsaly Area
9											

Note: codes (2 to 3) are allocated to the fixed telephone and codes (6 to 8) are allocated to the GSM

Source: Study Team

## 7.5 Improvement of Future Telecommunication Services

Presently, contents of services and service levels of PSTN and the cellular mobile phone are generally sufficient except large amount of backlogs. The Study Team recommends followings;

### (1) International telephone service

First, it is recommended that with the existence of many telecommunication operators, gateway function should be developed to present single interface to all operators. In addition to the future growth of international calls, the international switching functions should be separated and new systems should be introduced.

### (2) Public telephone service

A public telephone service is still key communication tools for the people who do not own the fixed telephone or cellular mobile telephone in the Lao P.D.R. Public telephone is urgently important even for the emergency communication. The development of the public telephone should be carried out by both LTC and ETL with the introduction of MSUs and RSUs.

### (3) Introduction of intelligent service

While the intelligent services are fully utilized in many developed countries, it is the one choice to introduce a called party billing service for the operators to increase profit. However, being large amount of investment is required for installing intelligent network, it should give more priority to the expansion of the existent telephone network than the introduction of advanced services from the present condition. First of all, the full satisfaction of waiter shall be considered before introduction of advanced services.

### (4) IP and Internet services

The Internet is critically important for the Lao people not only for business, but also for education, social development, and social welfare in the future. The Study Team recommends that the earliest development of IP infrastructure is necessary. Also, the Study Team recommends that the following expansion should be carried out to the local province cities systematically.

- 1) Improvement of the internet access environment in Vientiane: Increase the number of dial up serves and high speed internet access lines in Vientiane.
- 2) Improvement of the internet access environment in province centers: In Luangprabang and Savannakhet, the number of dial up access lines should be increased. Introducing dial up serves to other local province centers. It should be gradually expanded the local dial up servers in accordance with the expansion of backbone and leased line services to those cities.

In the following Table 7.3, the Study Team has summarized the recommendation on network services.

Table 7.3 Network Services for Lao P.D.R.

Network Service	Direction	Solutions
PSTN and the cellular Mobile	Basic services for the ordinal Lao people to use	Expand the service areas to increase the public utility Cover from whole district cities to whole villages
Public telephone	Necessary communication for general and emergency Communications for whole Lao people in every where else and at every time	Public spaces where people gathers and use (especially in rural areas where the number of telephone lines is limited)
International telephone	Earliest introduction of gateway service function to every telecommunication operators and introduction of international leased line services	To separate international telephone gateway function from transit switching function. Provide international leased line services.
Internet and IP services	To enhance IP and internet environment for the education and ICT. To increase access speed and accelerate dial-up servers in local province centers. International IX and Official DNS which represent Lao to international internet users should be introduced should be controlled and operated by officials	High speed Internet access: ADSL or wireless services in Vientiane Internet access: more dial-up servers in province centers International IX (Internet exchange) and DNS (Domain Name Systems) should be controlled by MCTPC and operated by ETL
Leased line services	Introduce leased line services officially to the government, embassies, and large companies	First, introduce of international and domestic service in Vientiane and major cities. Next, expand to the district cities based on the demand.
Operator, directory and guidance service	Operator or guidance for users who first use the telephone service (especially early users) and directory services for all cities are introduced in order to increase the usability.	International operator service should be provided at Vientiane Local directory and guidance service is provided in local cities Service should be introduced with profit and cost consideration English directory should be considered to increase the usage for foreigner and tourists
Intelligent Network services	It should be decided to introduce with the cost and profit analysis	Check the necessity for services
Data Communications	Provide the services by utilizing IP protocols. It should be decided to introduce with the cost and profit analysis	IP infrastructure introduced for ICT and Internet is utilized for data communication

## 7.6 Network Planning for the future

### (1) Transmission

Transmission is the key component for the coming backbone network. ETL plan for phase2 is the most important and the current plan is appropriate to install because the route 13 and 9 are the one of the most advanced road in Lao and its feasibility has been checked by ETL. Thus, the Study Team recommends that the earliest introduction of this optical fiber cable and transmission systems. On the other hand, the Study Team worries about the ETL plan phase3 and 4, because both regions are isolated by heal mountains and the road is not maintained in good condition especially in rainy season (Refer to Fig. 7.7~9).

The Study Team recommends that basic strategy is to introduce optical fiber together with SDH systems. Some places where optical fibers are not possible to introduce should be connected by other means, such as microwave or satellite links.

Current transmission network has not spurs, however, the network will become more important in 2015 due to the increase of users and ICT services on which Lao government heavily depends. Backup scheme should be applied as soon as possible. For the optical fiber cable with SDH equipment, the Study Team recommends that loop structure for the backbone network. Until the completion of fiber loop, the Study Team recommends that existing microwave may be utilized such as backup some important communications selectively.

### (2) Switching

Digital Switching systems should be introduced and expanded to cover the whole land in order to provide better services to the users. The team recommends the followings;

- ◆ Introduce MSUs to the large cities until 2005 (Luangprabang, Savannakhet, and Pakse), after the introduction of MSUs in 2005.
- ◆ Introduce RSUs to the district cities until 2010, and if needed until 2015.
- ◆ Introduce first VoIP type(c) switch from 2010 if available and replace old Digital Switching Systems from 2010 if needed. Those switches should be utilized as long as the lifetime remains.
- ◆ Reduce the number of transit switching node

### (3) Outside plant

Introduce new metallic subscriber cables for fixed telephone and ADSL subscribers. Also, rehabilitation for existing metallic cable is necessary.

(4) International Gateway Systems

Telephone Gateway

- International Switching Systems in Vientiane

Internet Gateway

- International IX in Vientiane

1) Gateway for telecommunication

The current international gateway for telephone and leased lines is provided by the transit switching system FETEX150 in Numphou. Due to limitations of the system, FETEX150 is designed for local and transit telephone services and not for international service. The full international gateway function has not been necessary because there is only a single telecommunications provider. However, as there are several telecommunications providers requesting international switching functions, a gateway function has become necessary. To provide an international gateway functions, a new international gateway should be introduced (Fig. 7.5).

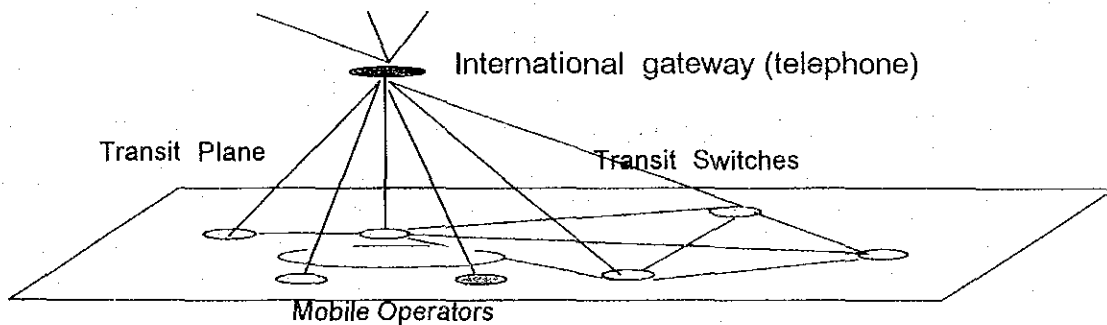


Fig. 7.5 International Gateway

Source: Study Team

2) Gateway for Internet

IX that interconnect ISP with the foreign IXs or ISPs and DNS that handles the official domain name for Lao P.D.R. should be necessary to represent official gateway interface to the foreign countries shown in Fig. 7.6. Providers or operators are able to set their own DSN to keep the copy of the content of official DNS for their use. It is because that the official DNS

provides the only information of all the domain names admitted by the government (or official) in Lao P.D.R. to the world. Assuring continuous administration, operation, and maintenance is very important. The Study Team recommends that IX and DNS should be controlled by MCTPC and operated by the public operators (presumably ETL). Same with the international telephone gateway, second international IX and DNS should be located in Savannakhet where there are alternative international connections to the Thailand and Vietnams.

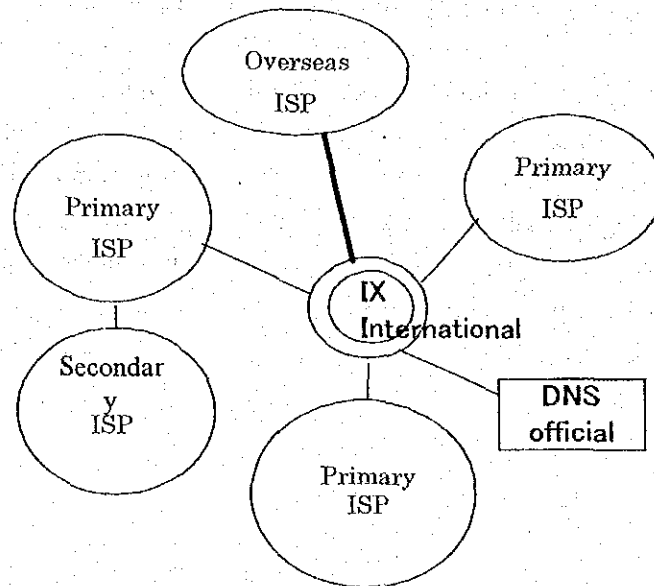


Fig. 7.6 International Gateway for the Internet

Source: Study Team

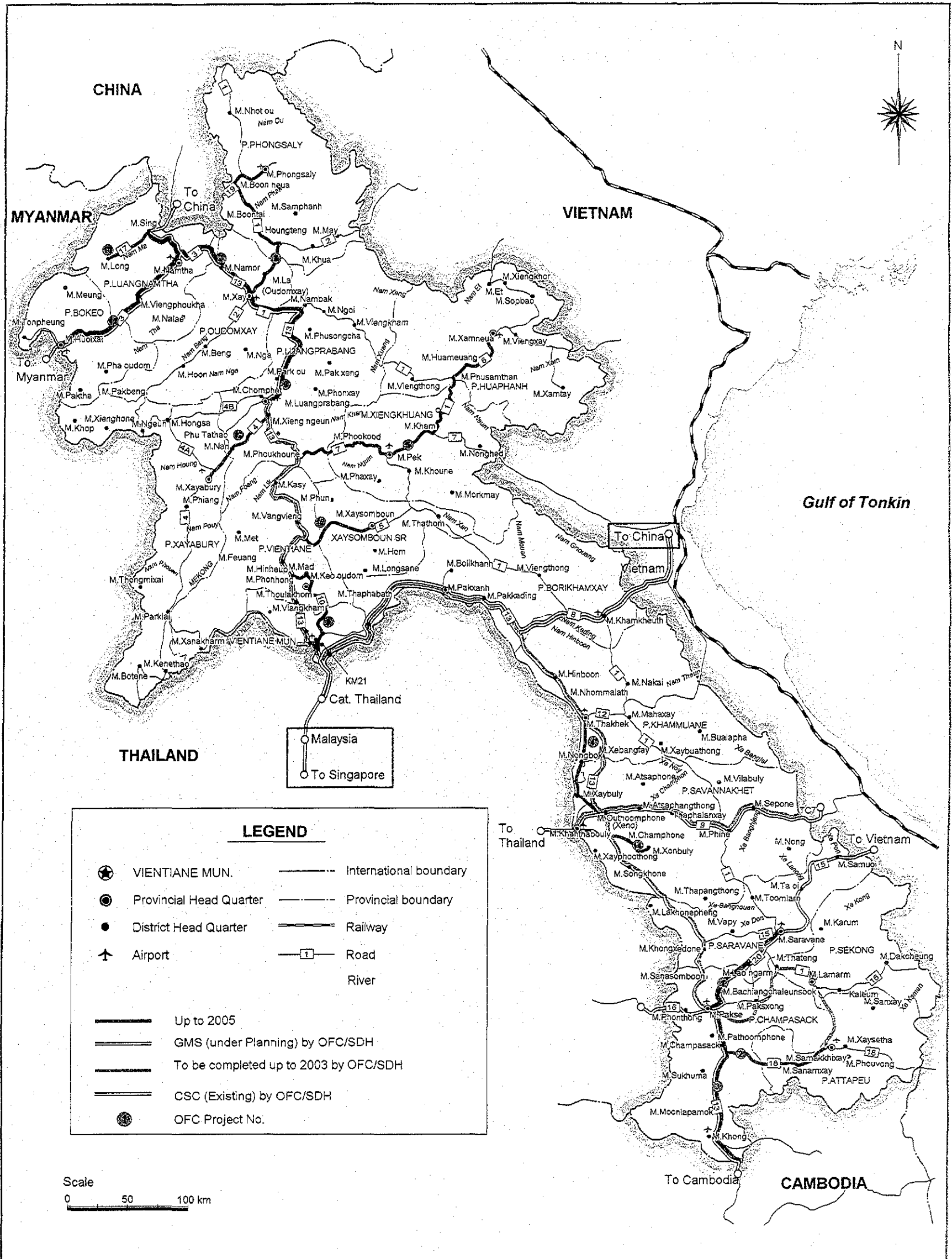


Fig. 7.7 OFC Transmission Network (2004 - 2005)

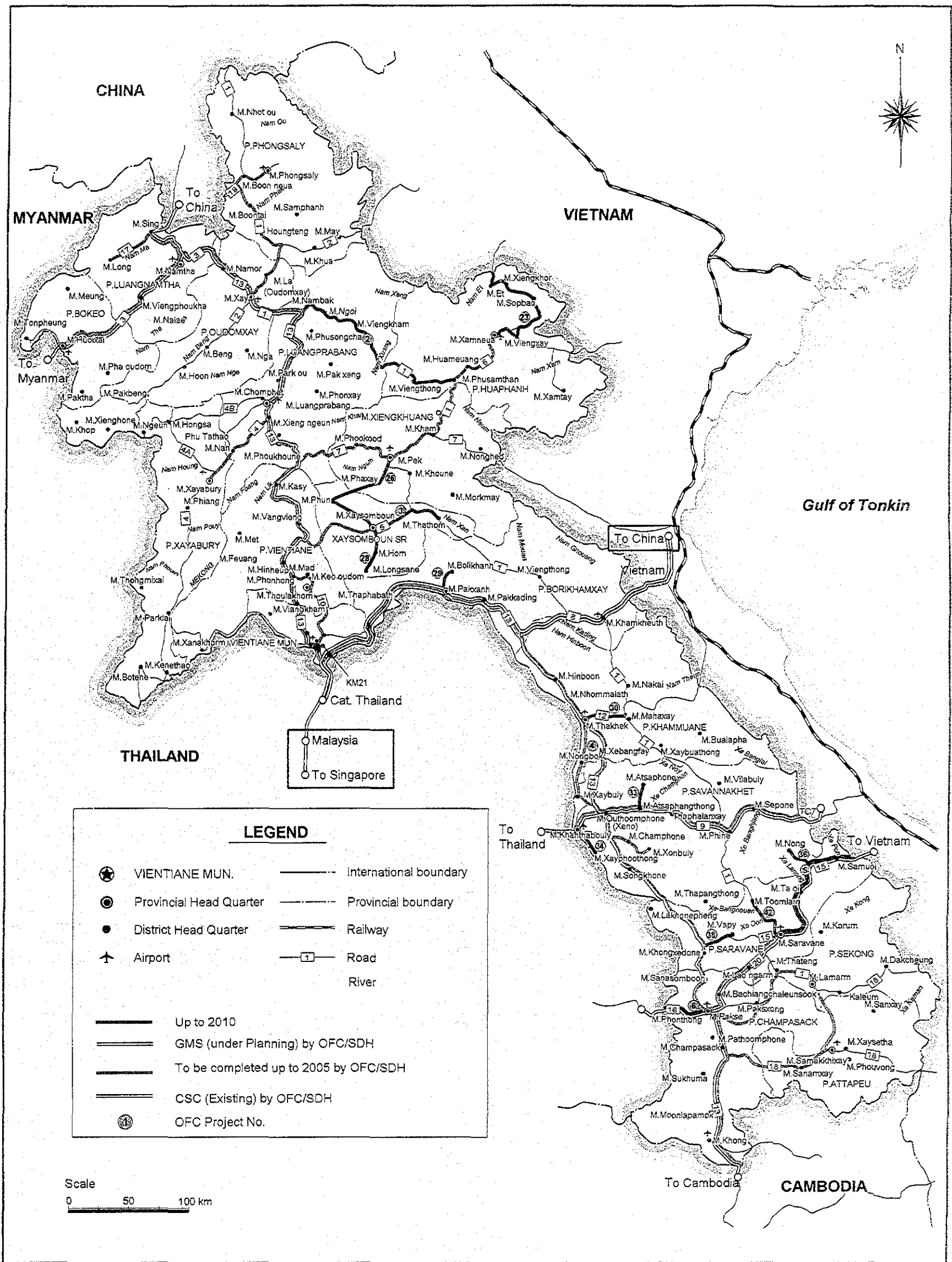


Fig. 7.8 OFC Transmission Network (up to 2010)



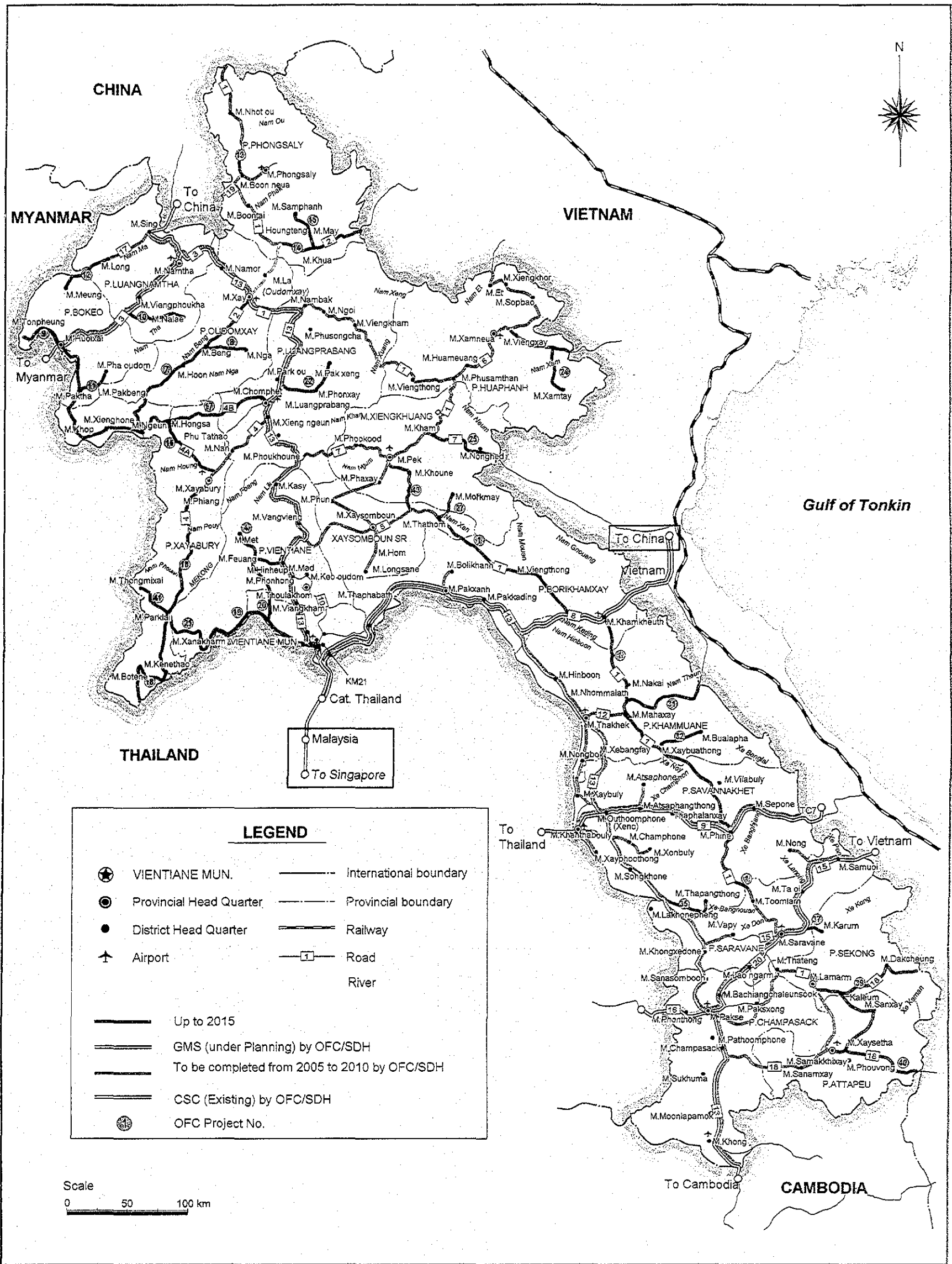


Fig. 7.9 OFC Transmission Network (up to 2015)

**CHAPTER 8**  
**RURAL TELECOMMUNICATIONS**

## CHAPTER 8 RURAL TELECOMMUNICATIONS

### 8.1 Current Situation in Lao P.D.R.

#### 8.1.1 General view

The total telephone subscribers and telephone density are 82,000 and 1.46 respectively at the end of 2001 according to World Telecommunication Development Report of ITU. For the purpose of assisting various studies and comparison, telephone density of Japan in 1952 was 1.8 which show very similar situation to present Lao P.D.R. The world trend indicates that during the GDP per capita is lower, the telephone density disparity between and urban and rural areas is larger reflecting the income disparity between such areas. As the consequence, there will be many villages and communities without telecommunication facilities in Lao P.D.R. today.

On the other hand, "Socio-Economic Development Strategy for 2020, 2010 and Five Years Socio-Economic Plan (2001-2005)" approved on 13 February 2001 in Vientiane emphasizes the eight priority programs of the Government. The communication is included there and other telecommunications related sectors such as electricity network expansion projects, hydro-power project, cross-country high way development projects, and transportation system are also included. If the projects of such related sectors are well accomplished as planned, it will greatly contribute to the realization of telecommunications facilities even in rural areas of Lao P.D.R.. Otherwise the telecommunications facility realization without the assistance of the development of other sectors will fall in prohibitive high cost.

#### 8.1.2 Rural Telecommunications Network installed by DETECON

Through the financial support from the Government of Germany, the rural telecommunications network using point-to-multipoint radio system called as D-MAS is being expanded starting from Phase I and reaching to Phase V which is expected to complete in 2004. After completion of this Project, around 2,200 telephone terminals will be served by this network. However, this figure of around 2,200 terminals is very small number compared with the total number of villages in Lao P.D.R. which is said to be 11,386. When considered that cities or towns will be given more than one telephone, many villages will remain without telecommunication facilities. The planned network until Phase IV is shown in Fig. 8.1.

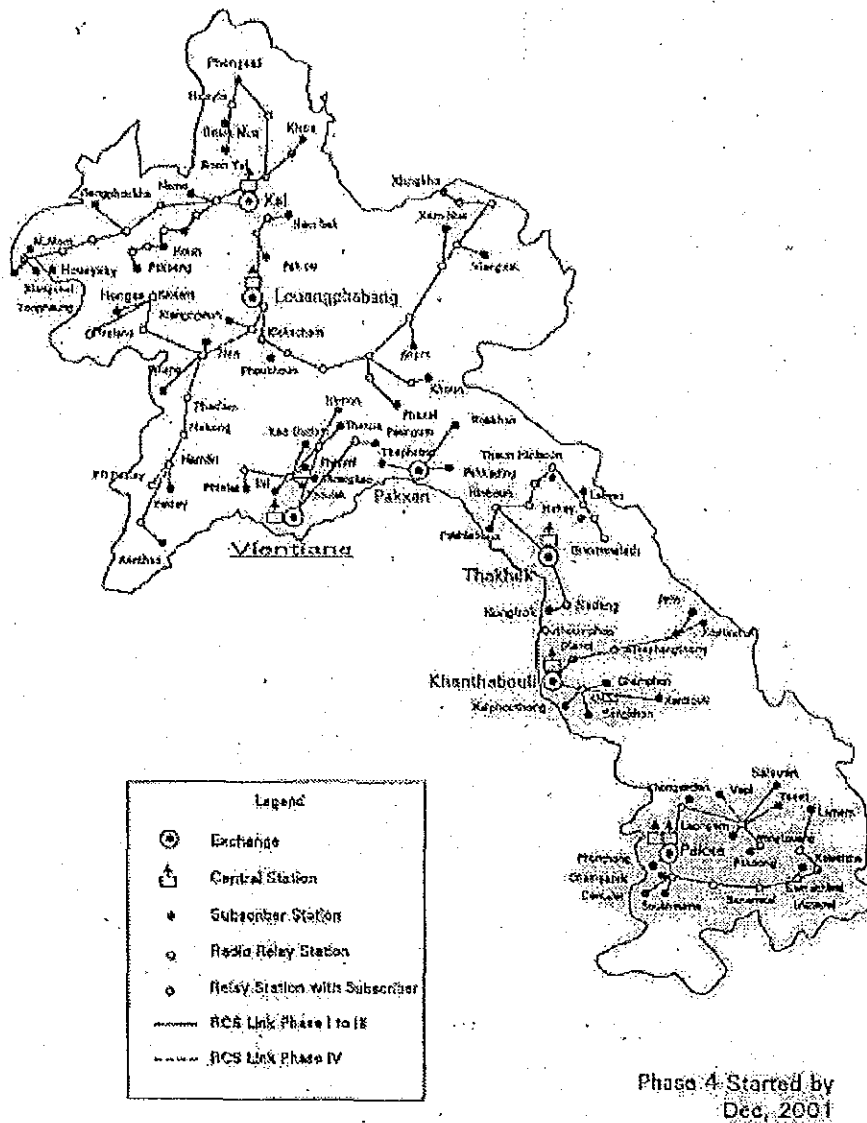


Fig. 8.1 Rutel Network Configuration

### 8.1.3 Telecommunications Network for the Ministry of Health

For providing the least communication link between the Health Care related Offices in Provincial Cities and District towns, and Health Posts in isolated rural areas, initially JICA of Japan installed 27 radio communication terminals under the project of Provisional Health Care. This Project is being followed up by an NPO called as BHN Association of Japan. Already the radio communication terminals have been installed in 89 sites and further 67 terminals will be installed within 2 to 3 years. The installation sites of this Project called as EPISN (Extension Program for Immunization Special Network) are shown in Fig. 8.2.

As the radio terminals in this EPISN network are armature radio type for saving the cost and the network can not access to the public telephone network, this EPISN network shall be regarded as the temporary emergent solution for healthcare service in rural areas before the arrival of ordinary public telephone service in these sites.

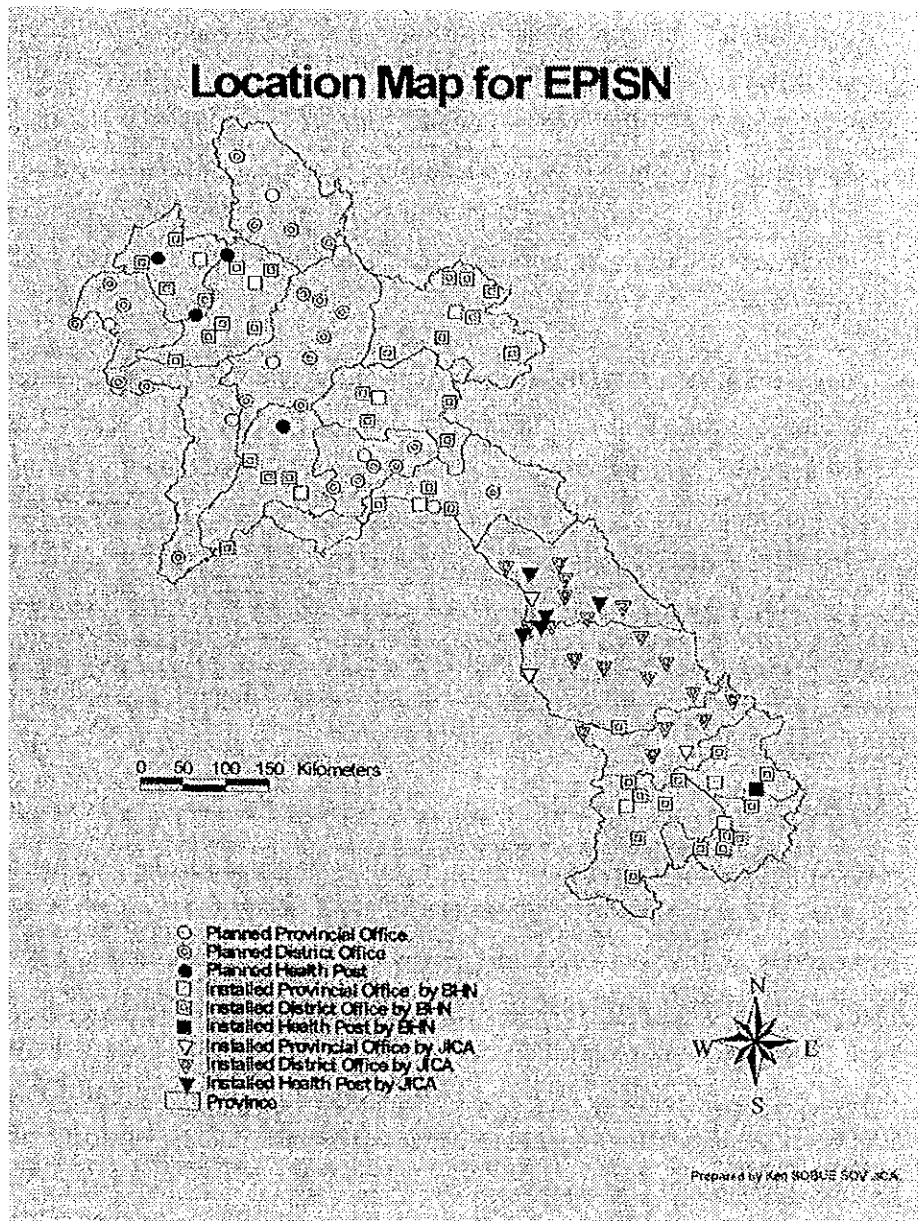


Fig. 8.2 EPISN Location Map

## 8.2 Rural telecommunications of the world

### 8.2.1 ITU's activity

(1) Since 1970s ITU has been emphasizing the importance of supplying telecommunications facility in remote and rural areas. The Handbooks related to rural telecommunications have been published and various Study Groups have been setting up and worked with changing titles related to the development of rural telecommunications. As the rural development is ever continuing important task in developing countries, ITU will still continue to study the issue of rural telecommunications until developing countries become developed countries as telling about Japanese experience and world trends later.

(2) Year 1983 was "WORLD COMMUNICATIONS YEAR" designated by United Nation. For supporting the vision of UN, ITU studied under the cooperation of OECD on the importance of telecommunications for the development. The result was published as TELECOMMUNICATIONS FOR DEVELOPMENT in June 1983. Its Chapter 4 is devoted to THE ROLE OF TELECOMMUNICATIONS IN RURAL DEVELOPMENT presenting the results of the researches done in India and Egypt, and estimates that the cost for rural telecommunications reaches ten times of that of urban areas.

### 8.2.2 Japanese experience

#### (1) History

World War II brought the number of telephone in Japan to half of that of before the War. The government recognized the importance of telecommunications for the recovery of the economic activities and introduced many measures including the preference for urban areas on recovery and investment rather neglecting rural areas. These policies were widely accepted by the people for about 15 years. The request of telephone service in rural areas became stronger and at the same time the Diet also passed the request to NTT in 1963 for making effort to offer better service in remote and rural areas.

#### (2) Development of rural telecommunications

NTT sincerely acknowledged the long time preference to urban areas and relative negligence of rural areas, and immediately tackled to various measures to solve this problem always stressing the importance of rural telecommunications. However, it took nearly 15 years for rural telecommunications services reached to the same level of urban services.

### 8.2.3 Lesson from other countries

The ITU Association of Japan is publishing "World Telecommunications Visual Data Book" every year using mainly published figures of ITU. According to the book, the all telephone demand of the whole country will be satisfied when the national mean telephone density reaches to around 40 per 100 populations. This figure in Japanese case is around 30.

### 8.3 Importance of Public Telephone

The first target of rural telecommunications is to provide the least communication measures to isolated rural communities. In this concept, public telephone or community telecenter (according to recent ITU term) shall play central role. In this context, Lao P.D.R. whose national telephone density is still low and having many no-telephone community should make big effort to provide public telephones. When telephone density raises, the relative importance of public telephone will gradually decrease because the ordinary telephone will be found everywhere.

### 8.4 Practical Approach in Lao P.D.R.

#### 8.4.1 General Consideration

The continuous mountainous areas in Lao P.D.R. will impose the most difficult questions in the world for rural telecommunications. The single solution will not be able to answer rural telecommunications, the most adequate method to suit to each environment shall be chosen.

The rural telecommunications shall be considered as one of the important infrastructure, and rural telecommunication development project shall be always included within the integrated rural development project.

The practical classification for the implementation of the rural telecommunications will be as follows:

- Where the power supply is available  
The co-installation of telecommunications cable with power lines using the poles of power lines is strongly recommended. If the plan of the installation of power line is being planed in near future, this opportunity shall not be missed.
- For the purpose of ensuring the least communication method, Rutel shall

be fully utilized. Furthermore, Rutel or similar systems shall be expanded even in the future.

- When the mobile telecommunications service area is being expanded along the road, the mobile terminals shall be installed as the fixed public telephones in the communities that are situated along the mobile telephone service areas.
- Where the above proposing methods are practically impossible, through using the near-by tower of microwave transmission, D-MAS or similar systems shall be introduced.
- Those isolated mines and remote regions important for industry where the installation of optical fiber cable is difficult, shall still rely on the radio system such as microwave system using Very Small Aperture Terminal (VSAT) system as the trunk transmission system. Therefore, the structural strengthening of microwave tower, improvement of access road to the tower, improvement of the power supply facility specially considering rainy season shall be implemented seriously.

General view of rural telecommunications is shown in Fig. 8.4-1.

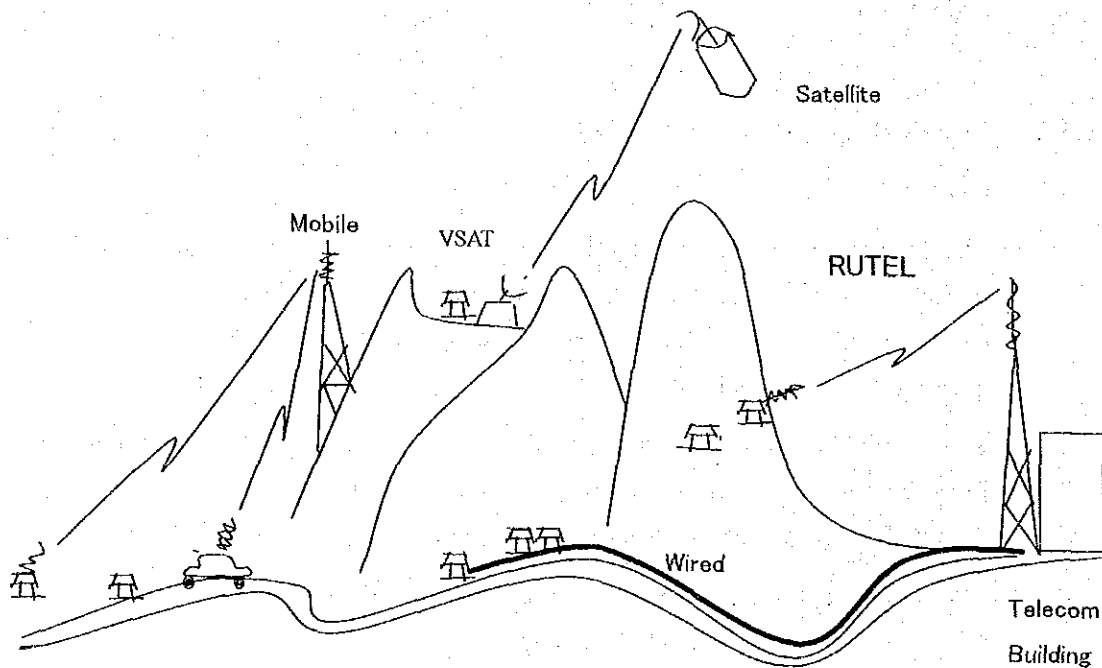


Fig. 8.4-1 General View of Rural Telecommunications

#### 8.4.2 Power Supply issue

All telecommunications facilities need power supply of whatever type. There is no



problem if commercial power supply is available. However, the rural telecommunications need special consideration for power supply. Battery, solar power, wind energy, micro-hydro power, and hybrid power system are the power supply systems proposed by ITU recently for rural telecommunications and IT system. The rural telecommunications in Lao P.D.R. shall choose adequate power system matching to each environment.

### **8.5 Funding Problem**

The rural telecommunications are, except very few special cases of the world, not profitable, and the wider deployment of the rural telecommunication service in Lao P.D.R. will need a large amount of fund. Rural areas are quite large compared with urban areas. The profit from the urban area service will not be large enough for the installation of rural telecommunications facility.

Considering this aspect, the rural telecommunications in Lao P.D.R. shall be developed through the implementation of Integrated Rural Development Project which shall include the construction of telecommunication facility and utilization of the Universal Service Fund based on the understanding that rural telecommunication is Basic Human Needs.

### **8.6 Scale of Implementation**

The items and level of telecommunications services in rural areas consisted with around 11,000 villages will not reach to those of urban areas even in 2015.

It is a bold but probably realistic assumption that on average 2 telephone lines will be supplied in every rural communities on the assumption of 1 line for local governments, 1 line for shop and public telephone under the common usage. This figure is average and smaller communities will have less and larger communities will have more. This means around 22,000 telephone lines will be working in rural areas in Lao P.D.R. in 2015.

The installation cost of rural telecommunications is assumed following:

- (1) Installation using mobile telephone system is assumed as \$300 per telephone, under the consideration of additional cost of mobile terminal without the infrastructure cost.
- (2) Installations of similar systems to Rutel Project, VSAT and metallic cable are assumed as \$3,000 per telephone with some cost reduction from current \$5,000 Rutel Project.

## *Summary*

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As the preference of installation is given to fixed usage of mobile telephone and others are considered as unavoidable cases where the mobile service will not reach in near future. The percentage for mobile system usage is thought to be 70% and the remaining will be 30%.

The total cost for the installation of 22,000 rural telephones is assumed to be \$ 24,420,000

- (1) The installation speed until 2015 is assumed gradual increase. And, the resulting installation from 2003 to 2005 is 4,000 costing \$4,440,000.
- (2) The installation during the next period until 2010 will be 8,000 costing \$8,880,000.
- (3) The installation during the following period until 2015 will be 10,000 costing \$11,100,000.