

CHAPTER 11 FACILITIES PLAN

11.1 Switching Facilities

Total facility plans for switching system are listed in the following tables.

(1) National Transit Switch

Table 11.1-1 Facilities Plan of National Transit Switch

National Transit Switch	1998		2000		2005		2010	
	Units	Capacity	Units	Capacity	Units	Capacity	Units	Capacity
Total	5	54,064	7	136,100	10	217,400	12	290,900

(2) Local Switch

Table 11.1-2 Facilities Plan of Local Switch

Local Switch	1998		2000		2005		2010	
	Units	Capacity	Units	Capacity	Units	Capacity	Units	Capacity
Total	80	2,049,887	97	3,141,100	142	5,618,400	216	9,423,700

11.2 Transmission Facilities

11.2.1 Inter-Provincial Network

(1) OFC Transmission System

The Master Plan requires installation of considerable new optical fiber cable and SDH equipment. The volume size of Optical Fiber cable and NE is shown in Table 11.2.1-1.

Table 11.2.1-1 OFC Transmission System

	Phase A	Phase B	Phase C	OFC km	NE
Backbone Loop		○	-	3,184	40
Loop 1 ~ 5	-	○	-	2,057	40
Loop 6 ~ 10	-	-	-	685	64
Loop 11 ~ 14	-	○	-	1,111	24
Spur link Tay Ninh	-	○	-	99	3
Total Km, NE	0	-	0	7,136	171

(2) Radio Transmission System

The facilities plan of radio transmission systems for inter-provincial network is established as shown in Table 11.2.1-2.

Table 11.2.1-2 Facilities Plan for Inter-Provincial Network

Year	Phase A 1999 - 2000	Phase B 2001 - 2005	Phase C 2006 - 2010	Total
Looping by Radio system	-	4 links	-	4 links

Note: Four (4) links are Ha Noi - Ho Chi Minh, Bao Ha - Lao Cai, Phadin - Dien Bien, Ho Chi Minh - Tay Ninh.

11.2.2 Intra-Provincial Network

The facilities plan for the intra-provincial network (about 1,800 links) is established based on the target to upgrade half of intra-provincial transmission systems by the year 2010.

Table 11.2.2-1 Facilities Plan for Intra-Provincial Network

Year	Phase A 1999 - 2000	Phase B 2001 - 2005	Phase C 2006 - 2010	Total
Replacement by Optical Fiber Cable System	100 links	240 links	180 links	520 links
Upgrading by Larger Capacity System	70 links	160 links	120 links	350 links
Total	170 links	400 links	300 links	870 links

11.2.3 Synchronization Network Facilities

Network Synchronization is essential to avoid the impairment caused by slips. Timing clock should be distributed from PRC to all NE with Master-slave method via SSU.

Table 11.2.3-1 below shows the number of provision of SSU.

Table 11.2.3-1 Facility Plan for Synchronization Plan

Year	1998 - 2000	2001 - 2005	2006 - 2010	Total
Backbone Loop	-	○	-	0
Loop 1 ~5	-	○	-	3
Loop 6 ~10	-	○	-	4
Loop 11 ~14	-	○	-	2
P & T Network	-	○	-	61
Total SSU	-	-	-	70

11.3 Access Network

11.3.1 Outside Plant

The necessary volumes of the outside plant facilities are estimated in conjunction with the demand forecasting results and represented with the total numbers of the subscriber lines that consist of the primary and the secondary lines. The estimated numbers of the subscriber lines include the following planned facilities ;

- Optical transmission systems
- Subscriber lines to be planned for the non-telephone-communes

(1) Primary Cable Lines

The numbers of primary cable lines to be newly installed in each phase are estimated with the average ratio of 1.4 (the ratio of the primary lines to the line units) as shown in the Table 11.3.1-1.

Table 11.3.1-1 Phased New Primary Lines

	Phase A	Phase B	Phase C
Total Lines	848,924	2,983,180	4,382,890

(2) Secondary Cable Lines

The numbers of secondary cable lines to be installed in each phase are estimated with the average ratio of 1.4 (the ratio of the secondary lines to the primary lines) as shown in the Table 11.3.1-2.

Table 11.3.1-2 Phased New Secondary Lines

	Phase A	Phase B	Phase C
Total Lines	1,188,542	4,176,579	6,136,169

11.3.2 Radio Subscriber System

The facilities plan of the radio subscriber systems is established category by category, i.e. facilities plan in urban areas and facilities plan in remote/rural areas.

(1) Facilities Plan in Urban Areas

In urban areas, radio subscriber systems apply mainly CDMA-WLL.

Table 11.3.2-1 Radio Subscriber Systems in Urban Areas

	Phase A 1999 - 2000	Phase B 2001 - 2005	Phase C 2006 - 2010	Total
No. of Areas to be applied	2	4	6	12
No. of Lines	40,000	80,000	120,000	120,000

(2) Facilities Plan in Remote and Rural Areas

In remote/rural areas, the facilities plan is established including the existing plan in the Central Region.

To expand and improve the telecommunications services in remote and rural areas, point-to-multipoint system using TDMA is to be used.

Table 11.3.2-2 Radio Subscriber Systems in Remote/Rural Areas

	Phase A 1999 - 2000	Phase B 2001 - 2005	Phase C 2006 - 2010	Total
No. of Lines	2,000	5,000	5,000	12,000
No. of Base Stations	4	10	10	24
No. of Subscriber Stations	200	500	500	1,200

11.3.3 VSAT System

The facilities plan of the VSAT system is carried out based on the network plan of the VSAT as follows:

Table 11.3.3-1 Facilities Plan of VSAT System

Item	Phase A 1999 - 2000	Phase B 2001 - 2005	Phase C 2006 - 2010	Total
No. of Additional Lines	125	313	313	751
Additional Transponder Bandwidth	About 1/3 transponder	About 1 transponders	About 1 transponders	About 2 + 1/3 transponders
VSAT Stations	50 stations	125 stations	125 stations	300 stations
Hub Station	Expansion in capacity	Expansion in capacity	Expansion in capacity	Expansion in capacity

11.4 Mobile Communications Facilities

11.4.1 Cellular Mobile Telephone Facilities

According to the network plan of the cellular mobile systems and the forecasted demand, the facilities plan of the cellular mobile telephone systems is established as follows:

Table 11.4.1-1 Facilities Plan of Cellular Mobile System

Items	Phase A 1999 - 2000	Phase B 2001 - 2005	Phase C 2006 - 2010	Total
No. of Additional Subscribers	139,128	620,271	639,670	1,399,069
Item to be required	Expansion of GSM (MSC in HCM, BSC, BTSs) Removal of AMPS Introduction of CDMA	Expansion of GSM (MSCs in Da Nang and Ha Noi, BSCs, BTSs) Expansion of CDMA Introduction of GMPCCM	Expansion of GSM (MSCs in HCM, BSC, BTSs) Expansion of CDMA Expansion of GMPCCS	-
Construction Cost (Million US\$)	122	484	474	1,080

11.4.2 Paging System

The facilities plan for paging systems is summarized in Table 11.4.2-1.

Table 11.4.2-1 Facilities Plan of Paging System

Items	Phase A 1999 - 2000	Phase B 2001 - 2005	Phase C 2006 - 2010	Total
No. of Additional Subscribers	6,000	1,000	100	7,100
Item to be required	Expansion of Paging	Expansion of Paging	Expansion of Paging	
Construction Cost (Million US\$)	2	1	1	4

11.5 Summary of Cost Estimation

Based on the facilities plan and cost estimations on each system, the investment costs are summarized as shown in Table 11.5-1.

Table 11.5-1 Summary of Investment Costs

Unit: Million US\$

Item	Phase A 1999 - 2000	Phase B 2001 - 2005	Phase C 2006 - 2010	Total	Remarks
Fixed Telephone System (POTS, Radio Subscriber Systems, VSAT)	546	1,705	2,348	4,599	
Mobile Communications	124	485	475	1,084	
Cellular Mobile System	(122)	(484)	(474)	(1,080)	
Paging System	(2)	(1)	(1)	(4)	
Total	670	2,190	2,823	5,683	

CHAPTER 12 OPERATION AND MAINTENANCE PLAN

This Chapter describes firstly the present situations of telecommunications operation and maintenance in Vietnam. Secondly, based upon the recommendations obtained from the study results, the improvement plan of operation and maintenance are proposed.

12.1 Present Situations of Operation and Maintenance

The present operation and maintenance and operation centers are divided by organization, by area and by facility/equipment in Vietnam.

(1) Switching Network Management

The switching network management can be divided into hierarchical groups from the highest organization of the Head Office to P&T O&M centers, as shown in the following;

- (a) International Switching Group: VNPT ↔ VTI ↔ VTI 3 ITC(Ha Noi, Da Nang, Ho Chi Minh)
- (b) National Transit and Local Switching Group: VNPT ↔ VTN ↔ 3 Regional Transit Center (Ha Noi, Da Nang, Ho Chi Minh) ↔ Local Switch (Remote Switch)

(2) Transmission Network Management

For the transmission network management, there are also hierarchical groups in relation to network facility and their system, as shown in the following;

- (a) Transmission Backbone Network: VNPT ↔ VTN ↔ 3 Regional OMC (Ha Noi, Da Nang, Ho Chi Minh) ↔ 3 Regional Sub-section OMC (Vinh, Qui Nhon, Nha Tran)

For Optic Fiber Cable : 6 OMCs-Ha Noi, Vinh, Da Nang, Qui Nhon, Nha Tran, Ho Chi Minh

- (b) Transmission Equipment OMC: VNPT ↔ VTN ↔ 3 Regional Transit Center (Ha Noi, Da Nang, Ho Chi Minh)
- (c) Provincial Integrated OMC Group: VNPT ↔ 61 Provincial P&T OMC (Ha Noi, Da Nang, Ho Chi Minh) ↔ Intra-province transmission

(3) Subscriber Network Management

The subscriber network management can be described as "Access Network" in another way of network formation. As for an operation and maintenance center for the subscriber network, the integrated OMC of Provincial P&T plays an important role for Outside Plant System. Deployment of Operation and Maintenance is shown in Figure 12.1-1.

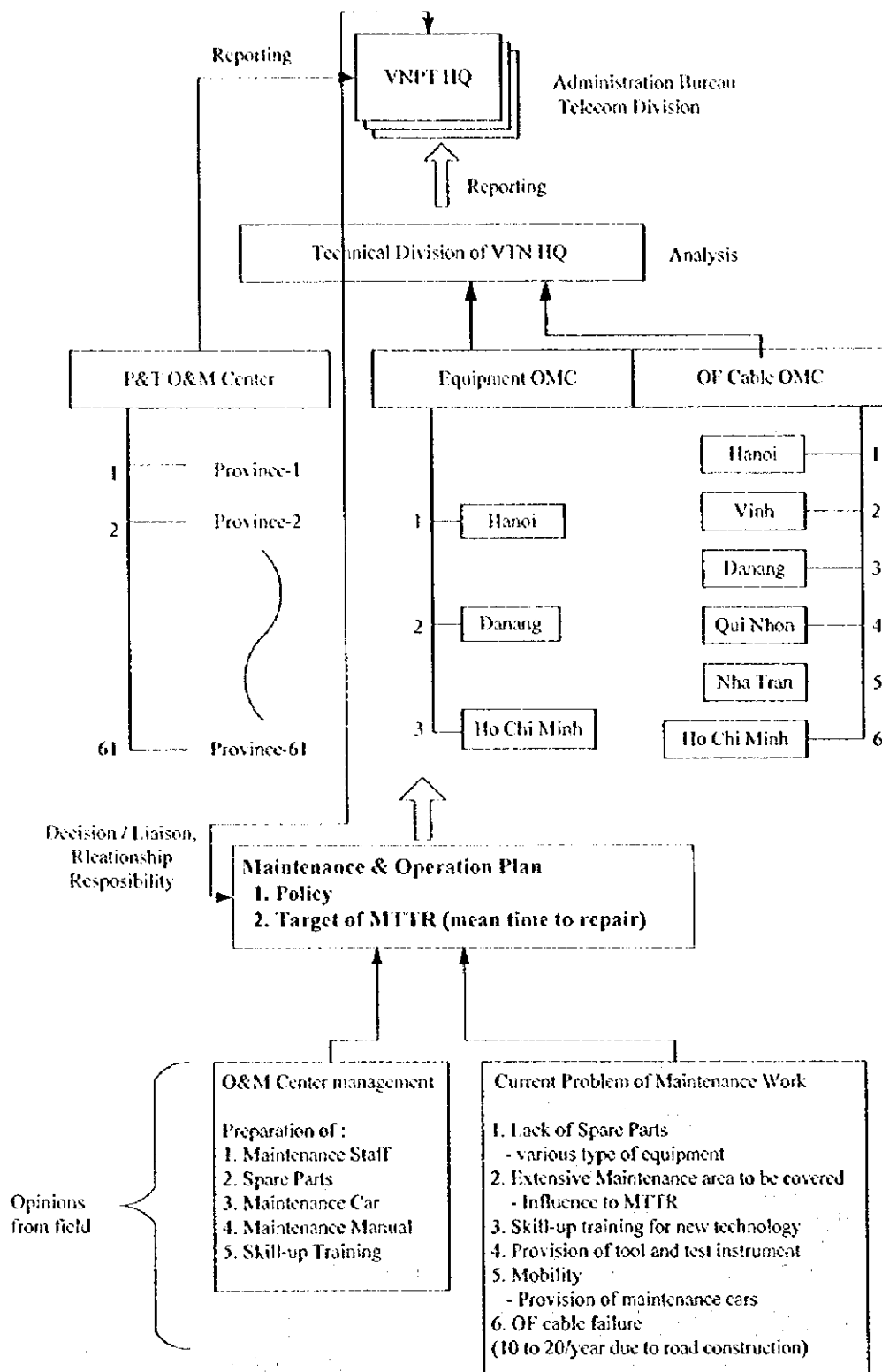


Figure 12.1-1 Deployment of Operation and Maintenance Center

12.2 Improvement Plan of Operation and Maintenance

12.2.1 Organization and Jobs of Operation and Maintenance

(1) Organization and Functions for Operation and Maintenance

In accordance with the telecommunications development plan up to 2010, the telecommunications infrastructure will be expanded to the order of about 7.7 million lines for the fixed telephone, about 1.6 million users for the mobile.

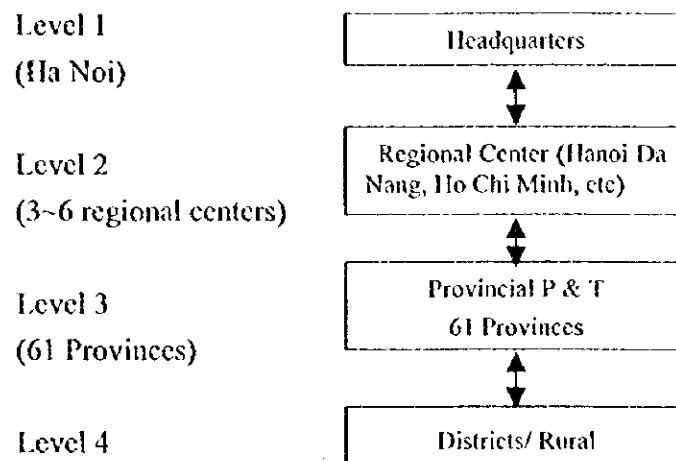


Figure 12.2.1-1 Four Level Architecture of Operation and Maintenance

Therefore the operation and maintenance needs a great deal of work in order to control and manage a huge network in respective operators such as P&T VTN, VTI, VMS, GPC, VNN of VNPT, VIETEL and Saigon Postel.

To solve this problem, the operation management organization should be coherent with the structure of telecommunications network, and decentralization of maintenance of the national principal carrier, for example VNTP, is essential.

It is necessary to strengthen the present Headquarters functions and jobs procedures so that provincial P&T will keep a harmonious correspondence and relation between the Headquarters and themselves by avoiding any confusion for the new work when the more effective decentralization will be put into force in the future. Also, Headquarters staff will be relieved from the operational and managerial jobs and will be able to devote themselves to working on administration policy decisions.

Four (4) level structure is illustrated in Figure 12.2.1-1.

(2) Task and Job

Task and job in each level should be well defined and clarified for implementation, as follows:

- (a) Level 1: Headquarters Level - administration job, standardization, budgeting / approve
- (b) Level 2: Regional Level (Numbers of levels; 3-6) - fault control / record, spare control
- (c) Level 3 / Level 4: P&T and District Level - daily repair works, reporting

(3) Management and Improvement of Operation and Maintenance Works

In order to improve the performance of the tasks and jobs mentioned above, the organizations concerned have to make best efforts for a complete achievement of the target/ policy. For that purpose, it may be necessary to develop the capability of individual staff and delegate authority to each level of the Members/Staff. Each member/staff should understand the business activity and work actively and work toward realization of the target/policy assigned to him.

12.2.2 A Method of Managerial Improvement: PDCA Cycle

One of the methods to improve the work quality and activity is introduced herein so that telecommunications activity in Vietnam can be upgraded as much as possible.

This method is called as PDCA (Plan, Do, Check, Action) cycle.

Each step of PDCA Cycle can be explained as follows:

- (a) It begins with a study of the current situation, during which data are collected for the use of formulation of an improvement plan. The study can be done by using the quality control tools such as Cause –and- Effect diagram, Histograms, Control Charts, Graphs, Check sheet, etc.
- (b) Do: Once the plan has been finished, this is implemented by applying the above plan
- (c) Check: The implementation is checked to see whether the anticipated improvement has been brought about or not.
- (d) Action: When this trial has been successful, a final action, for example methodological standardization and institutionalization of the improvement, is taken to ensure that the new methods introduced will be executed to sustain the improvement.

A series of PDCA activities are cyclic and the improvement will be thus promoted through the repeated cycle of PDCA, as shown in Figure 12.2.2-1.

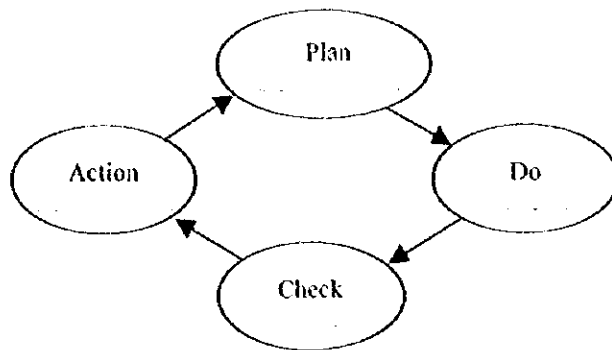


Figure 12.2.2-1 PDCA Cycle

12.2.3 Customer Service System Improvement

The delay in connection works for new subscribers may be caused by infrastructure shortages such as switches, primary cables and secondary cables and inadequate service order management. Countermeasures against infrastructure shortages should be taken through the improvement plans of Operation and Management for subscriber services order jobs. These countermeasures should cover the following improvement items on the service order management:

- (1) Subscriber Registration
- (2) Application List Management
- (3) Plant Record (Location Map) and Loop Assignment Record
- (4) Priority (Order of New Connections)
- (5) DP Allocation
- (6) Billing System

In this respect, Operation and Maintenance Center for subscriber service order should be strengthened and improved as much as possible.

12.2.4 Improvement of Telecommunication Service Quality

In order to improve the reliability and productivity of telecommunications sectors throughout the country, it may be urgent to set up a standardized target and levels of telecommunications quality control in relation to the fault rate, successful call completion rate and repair time, as shown in Table 12.2.4-1.

Table 12.2.4-1 Performance Target of Service Quality

Performance Target of Service Quality	Recommendation Items and standardization levels for Operators in Vietnam
(1) Fault Rate	Average number of monthly faults must be improved to keep the value the targets specified by DGPT or Operators
(2) Fault Clearance Time	Fault clearance ratio for full recovery should be standardized
(3) Call Completion Ratio	Local call, Long Distance call and International call completions should be standardized.

12.2.5 Failure Control and Spare Part Storage

Considering the expense of operators, it is better to store necessary spare parts for facilities of switching, OSP, radio, transmission, data, mobile etc. in accordance with the calculated results of the equipment availability (MTBF). But for the convenience of the spare part control, there are some methods to decide the quantity of storage by using percentage of main equipment cost or the investment cost of the relative facilities.

For example, 6-8 percent of the existing facilities may be used for the spare part storage. The organization should be set up for this control.

12.3 Introduction of Telecommunications Management Network (TMN)

Since the TMN recommended by ITU has advanced functions for advanced O/M and management of telecommunications networks, it may be better to introduce it in an appropriate time in the future:

- (1) Provide appropriate management infrastructure to operate and manage these intelligent networks
- (2) Provide a management network with standard protocols, interfaces and architectures
- (3) Provide a host of management functions and communications for OAM (operation, administration and maintenance) of Telecommunications Network

CHAPTER 13 HUMAN RESOURCE DEVELOPMENT PLAN

This Chapter describes firstly the present situations on human resource development of telecommunications sector in Vietnam. Secondly, based upon the important and urgent recommendations obtained by the study results, the improvement items for human resource development plan are proposed.

13.1 Staffing Plan

13.1.1 Current Situation of Staff Structure

(1) Manpower of Telecommunications Sector

As for the telecommunication manpower figures, the total staff of DGPT is estimated at about 500, while VNPT has a total of about 37,400 telecommunications staff, including all VNPT subsidiary company and institutions- state member operating companies such as VTN, VTI, VDC, VMS, financially independent subsidiaries, administrative subsidiaries, etc. - up to 1998.

(2) Staff Structure by Academic Level

The total number of existing staff is not possible to be classified into the above-mentioned subsidiary organizations, but a staff structure by academic background is available for the year 1992/1993 and 1997/1998, as shown in Table 13.1.1-1.

Table 13.1.1-1 Staff Structure by Academic Levels (92/93-97/98)

Items	Figure- 92/93		Figure- 97/98		Change
	Total number	Percent	Total number	Percent	
-Workers	13,600	68 %	27,200	68	0 %
-Technicians, Sen.Technician	3,280	16.4 %	5,600	14%	-2.4 %
-Engineers	3,120	15.6 %	7,200	18%	+2.4 %
Grand Total	20,000	100 %	40,000	100%	
No. of TEL	157,000/ 255,000		1,399,000/ 1,450,000		+890 % +569 %
Teledensity	0.23/0.36		1.83/2.26		
No. of TEL per Staff	8/13		31/39		

Source: ITU Report (DETECON '93)/DGPT

(3) Staff Structure by Professional Specialty

Table 13.1.1-2 Staff Structure by Professional Specialties

Telecommunications Sector – Professional Specialties	Percent	Remarks
-Switching & its related specialties	10 %	O/M, Construction, etc.
-Transmission/Radio	13 %	O/M, Construction, etc.
-Outside Plant	20 %	O/M, Construction, etc.
-Customer Services	30%	Service Order, O/M
-Administration and Management	27 %	
Total	100 %	

Source: JICA Pre-Study Team

According to the data obtained from the study, the professional specialties of the current staff structures may be shown in Table 13.1.1-2 as an estimated basis.

13.2 Staff Estimation for Telecommunications Sector

(1) Required Number of Staff in Vietnam

The required number of staff for telecommunications sector can be obtained from the linear equation $Y = 3.1618X + 40.917$ (Y: Productivity, X: Teledensity) in relation to the productivity, demand forecasting results mentioned in Chapter 7 in this Part from the past time 1998 up to year 2020 covering the telecommunication development plan. Table 13.2.1-1 shows the required number of staffs for the Human Resource Development up to 2020.

Table 13.2.1-1 Staffing Plan for Telecommunications Sector

Items/Year	1998	1999	2000	2005	2010	2020
No. of Telephone(thous.)	1,792.0	2,099.5	2,398.3	4,529.0	7,659.6	18,093.6
Teledensity	2.33	2.68	3.01	5.25	8.29	17.62
No. of Mobile (thous.)	234.0	295.2	347.5	967.7	1,667.4	3,808.2
Teledensity	0.30	0.37	0.44	1.12	1.74	3.71
Total Teledensity	2.63	3.05	3.45	6.37	10.03	21.36
Population (thous.)	76,900	78,373	79,716	86,257	92,398	102,707
No. of Staff	37,400	38,600	43,200	63,600	85,800	139,900

Source: DGPT/JICA Study Team

(2) Allocation of Staff

The total number of the required staff or employees for telecommunications sector must be shared among operation company, organizations (fixed telephone, mobile, data, video, etc), academic level (worker, technician, engineer, expert, etc), professional works (switching, radio, transmission, outside plan, customer services and administration). In addition to this, it must be noted to put more emphasis on importance of assignment for function level such as clerk, office worker, assistant, manager, director, etc. since the free and open competition will become more and more severe throughout the world.

13.3 Staffing Productivity

13.3.1 Present Situation

According to ITU "World Telecommunication Development Report 1997/1998", the number of telephone lines per staff in Vietnam accounts for about 35~50 as of the end of 1998. This can be defined as a staffing productivity, because the number of telephone

lines per staff is an indicator of productivity-it may be referred to as staffing productivity. Vietnam's telecommunication sector has made a rapid increase in the staffing productivity among ASEAN countries. A comparison of staffing productivity in relation to the telephone line per staff among some developed countries shows that Vietnam's productivity (165 at 2020) will be very much improved up to 2020 as compared with some industrialized countries like Australia, Canada, France, Germany, Japan, Sweden and U.K (average 218 at 1996).

13.3.2 Improvement of Productivity

The Vietnamese telecommunications productivity up to 2010/2020 is summarized in Table 13.3.2-1.

Table 13.3.2-1 Staff and Telecommunications Productivity in Vietnam

Items/Year	1998	1999	2000	2005	2010	2020
Total Teledensity	2.63	3.05	3.45	6.37	10.03	21.36
No. of Staff	37,400	38,600	43,200	63,600	85,800	139,900
Productivity per Staff	55	61	65	91	114	165

As of 1998, the figures of the staff and the productivity account for 37,400 staffs and 55 lines per staff if the telecommunications subscribers involve both of POTS and mobile lines as shown in the table. The productivity indicators will be increased almost 2 times higher than the present by 2010 and about 3.0 times higher by 2020, by which time Vietnam's telecommunications sector productivity will have reached current average index levels of the industrialized countries (average index of the industrialized country is about 146 lines per staff in 1990).

13.4 Training Activities

13.4.1 Existing Training Situation

There are two (2) training centers -in Hanoi and Ho Chi Minh- and three (3) workers schools under responsibility of VNPT. In the training centers, there are Fundamental and Advanced training courses (2~4 year long-term courses, for technician and workers), Professional Training course and General Basic training course. For the long-term training course, training centers receive about 3,000 students every year. There are more than 100 training programs besides the long-term training courses in both centers. In the Workers training schools, about 8,000 trainees receive the course programs every year.

13.4.2 Improvement of Training Activities

From the necessity for the human resource development in Vietnam: which both the implementation works of the telecommunications development plan and the introduction of new technology will require, the training activities in the fields of telecommunications should be improved based upon the following order:

(1) **Priority and Urgent need for training**

Priority and urgent need for training are as follows: New Technology training (Digital Communication, ATM, Frame Relay, CDMA, ISDN, LAN, etc.), Software Development, CAI, Remote Learning, Information Technology (IT), High level education and training (University and Doctorate Level), and International Training.

(2) **Changes in society and fair competition**

The human resource development and training policy have to cover overall aspect, not limited to one operator.

(3) **Training Policy and Administration**

Based upon the above-mentioned reasons, a more powerful and commanding training policy and administration need to be established.

(4) **Modernization of the training system and development of manpower**

The success of VNPT and other operators depend on the efforts and ability/skill of individual staff because a manpower may be the most important resource for the business activity. It is expected that the works will become large-scaled one and more complicated one in order to improve the telecommunication networks, and to provide new customer services. VNPT must develop skills and abilities of its employees up to the sufficient level so that they can operate/provide the complex, massive, sophisticated facilities, and new services such as multimedia.

13.5 Improvement Plan for Human Resource Development

In order to implement the improvement plan for human resource development up to 2010 and 2020, the following measures should be taken as much as possible:

(1) **Staffing Plan for Telecommunications Sector**

The estimated number of staff up to 2010 and 2020 for the telecommunications sector must be distributed in accordance with necessity among carriers and/or operators. Sub-classifications and assignment of required staff should be also made for appropriate staff structures by academic level and professional specialties.

(2) **Improvement of Telecommunications Productivity**

Substantial plans should be carried out as described in the above-mentioned Section

13.3 and related paragraphs. For further improvement, the human resource development plan must be worked out in such way that the staff has to make efforts for enhancing the service quality on one side and for achieving the expansion target of facility quantity on other side.

(3) Planning Items for Human Resource Development

The human resource development plan needs to establish a proper human resource management plan that should have:

- (a) the service level as the target for staff allocation.
- (b) the required manpower that should be reflected by work volume, service level, and costs.
- (c) close links with the operator total management plan and operation and maintenance plan for organization of each division and unit.
- (d) a macroscopic staff plan that should be part of the manpower management, and the development policy and DGPT/VNPT plan that should be a guideline to coordinate the staff increase requirements from each division and unit.
- (e) doctorate, post-graduate and senior engineer qualifications for technocrats should be prepared through scholarship and ODA funds both abroad and domestic fields.
- (f) utilization of assistance by foreign partners for human power development.
- (g) persons with international experience should be educated and increased more in number and in skill.

(4) For the Preparation of New Services and Technology

(a) Human Resource Development Plan for Information technology

The human resource development plan for Information Technology (IT) and NII should be implemented during this period.

(b) Relocation Plan of Manpower

Up to 2010, not only new technologies such as ATM, IT, CDMA, etc. but also the target of 8 % penetration of main telecommunication line will be achieved.

Therefore, a new allocation plan for human power will be necessary. Since the universal services throughout the country will be performed, relocation plan of manpower may be worked out in order to balance the assignment in both urban areas and rural areas.

CHAPTER 14 FINANCIAL AND SOCIO-ECONOMIC EVALUATION

14.1 Base Case and Sensitivity Analyses

At first, the Master Plan under the current tariff is financially analyzed and the analyses for the Scenario 1 demand will be followed as sensitivity analyses. After that, another sensitivity analysis was made for the case that the international settlement rates decreased to USD 0.23 per minute from the year of 2002 based on the FCC (Federal Communications Committee in USA) benchmarks for international settlement rates. At last, the impact of revenue decrease and OPEX increase were studied.

14.2 Financial Analysis

14.2.1 Concept for Evaluation

A considerable difference in profitability is expected between the existing network and the proposed network in the master plan. Therefore, the evaluation focuses only on the master plan related portion to analyze profitability of the proposed investment in the master plan.

14.2.2 Comprehensive Financial Evaluation

At present, telecommunications operation in Vietnam is supported by key subscribers who pay more than the future subscribers. As the economy grows and with the expansion of scale of telecommunications market in Vietnam in the future, demand for telephone installation increase as new subscribers seeking to enjoy the benefits of relatively low tariffs.

This demand, however, comes mostly from general subscribers who pay less than existing subscribers. The master plan's projected profitability would be inferior to that of the existing network.

Although continued investment is required at this stage, telecommunications operators alone cannot accommodate it; outside funds must be introduced. In implementing an investment program, it is important to prevent the profit ratio from suffering and to focus on fulfilling demand. The government then has to support financially and to prepare a government's guarantee for foreign loans. Especially, for the unprofitable telecommunications development in rural area, in addition to cross subsidies, it is essential to introduce foreign grant aids or low interest loans.

Table 1.4.2-1 Summary of Profitability and Revenue Structure

FIRR	38.0 %
NPV (thou. USD)	3,229,205
Int'l revenue share	53.7 %
International traffic share	5.23 % (In: 4.10 %) (Out: 1.13 %)

Note: Traffic share means the share of call minutes.
10% of discount rate was applied.

14.2.3 Financing Requirement

As a result of financial analysis for the Master Plan, the amount of financing arrangement to be required was calculated. However, those figures were calculated for the whole telecommunications operators in Vietnam under the most efficient allocation of capital. Actual financing requirement should be studied for each operator or project.

14.3 Socio-Economic Analysis

14.3.1 Social Benefit

The expansion and improvement of telecommunications networks will contribute a great deal not only to economic benefit but also to Social Benefit, the improvement of the national well-being.

Such indirect benefits conceivable for nation are:

- Greater ease in emergency access to medical institutions and etc.
- To enhance business activities
- To increase employment opportunities, improvement in security, etc.

With the combination of above social effects and other economic effects, national economic growth will be promoted and the people's life standard will be improved.

The result of financial analysis suggests the viability of this master plan as well as its important role for the national development. The government should recognize and assess other national benefits which are difficult to be quantified, from a nation-wide communications network, solving the 100% demand fulfillment, and etc. and keep balance with other socio-economic development plans.

14.3.2 Economic Evaluation

Economic evaluation is more conceptual approach than the financial evaluation with the

assumption that economic evaluation employs perspective of society while financial evaluation is based on business entity's perspective. Therefore, economic benefit and cost are not directly related to actual monetary flow.

The EIRR for the proposed master plan has been calculated at 51.3% with a net present value of USD 4,464,289 thousand. In addition, the Master Plan is expected to benefit the economy, through higher economic activities, due to improved telecommunications facilities which are difficult to quantify.

The proposed master plan is expected to have economy-wide benefits. It will help the sectors to improve telecommunications facility and efficiency to enhance service quality, to expand network capacity, to fulfill the 100% demand, and to increase geographical coverage. For business fields, improved telecommunications services will help to enhance productivity, and the presence of a sound regulatory framework will help to build investors confidence.

CHAPTER 15 PRIORITY PROJECT

15.1 Priority Project

(1) Medium-Term Project

(a) Selection of Listing Project

The priority projects are selected out of the listing projects to be implemented during a period up to 2005 (Phase B). Listing projects are compiled from ① Projects related to regional telephone expansion ② BCC projects (Business Cooperation Contract project for big urban telephone expansion) ③ Projects related to long distance network expansion program ④ Projects related to the service development other than the telephone ⑤ Subordinate Projects directly linked with the improvement of a corporate management. A total of 26 big-scale and small-scale projects are selected for Phase B project.

(b) Selection of Proposed Projects

The proposed projects are selected out of the listed project mentioned above in Item (a) by excluding BCC projects and the projects related to the service development other than the telephone. The excluded projects are also subordinate projects with less urgency and lower ranked importance.

(c) Selection of Priority Projects

The priority rankings are put in order based upon the following criteria in relation to the agreed items in Vietnam such as a priority degree in Vietnam, social benefit and the like.

In accordance with the priority ranking, seven (7) priority projects are selected as listed in the following table. The priority rank for regional network projects of a), b) and c) is put in higher order from lower teledensity for the subjective regional areas and e), f) and g) is put from the urgency.

Table 15.1-1 Priority Project List

Project description	Cost	Priority
a). North Province Project : 20 Provinces, 101,000 lines	\$ 91 M	1
b). Mekong Delta Province Project : 12 Provinces, 124,000 lines	\$ 112 M	2
c). Central Province Project : 12 Provinces, 92,000 lines	\$ 83 M	3
d). Inter-Province Network Project : 14 SDH OFC Loops, 4 Radio & SDH links	\$ 150 M	4
e). Frequency Monitoring Project : 8 location including Yen Bai	\$ 8 M	5
f). OPMC (Outside Plant Management Center) : Hanoi	\$ 8 M	6
g). VSAT for government emergency communications system : Nationwide	\$ 10 M	7

(2) Other Priority Project

The following two (2) projects are strongly requested to add as priority projects by DGPT.

- (a) Vietnam Telecommunications Satellite (VINASAT)
- (b) Domestic Submarine Optical Fiber Cable System

For these priority projects, further study should be conducted to give the higher priority and urgency on the project implementation.

15.2 Financial Analysis for the Priority Project

The Northern telecommunications development (North Province Project) for the Phase B (2001 – 2005) was financially analyzed as the highest priority project for the phase selected by the Study Team under the base demand forecast of this Master Plan and the current tariff.

As the result of financial analysis, the Financial Internal Rate of Return was calculated at 5.2%. Considering its scale of business and profitability, this project cannot be financed by a telecommunications operator alone. The Vietnam Government should take a financial initiative to introduce soft loans such as ODA finance, and others.

CHAPTER 16 RECOMMENDATIONS

Recommendations on Telecommunications Development Plan that has been formulated through the study on the national telecommunications development plan in Vietnam. Improvement issues are picked up in order to implement the telecommunications services more effectively and smoothly.

The recommendation items are roughly divided into policies for network development, telecommunications administration and management, telecommunications services /facilities and state management policy.

16.1 Policies for Network Development

Telephone and mobile density is planned to be increased. The targets for higher telephone and mobile density and more extensive network coverage were set based on the present status of telecommunication facilities and demand forecasts.

It is recommended that the DGPT recognize the importance of telecommunications and give a higher priority to telecommunications, and to achieve the targets of telephone and mobile density up to 2010 which are listed in the following table.

Table 16.1-1 Target of Telephone and Mobile Density

	1998	Phase A 2000	Phase B 2005	Phase C 2010
Telephone Density	2.33	3.01	5.25	8.29
Main Lines (x1000)	1,792	2,399	4,529	7,660
Mobile Density	0.30	0.44	1.12	1.74
Subscribers (x1000)	234	347	967	1,607

16.2 Telecommunications Administration and Management

(1) Human Resource Development

The necessary number of staff up to the years 2010 and 2020 should be allocated by effectuating an adequate introduction of new technologies, enhancement of operation efficiency and improvement of organizations. The number of staff necessary for the year 2010 should be adequately more than doubled as compared with that of 1998. In addition to this, the staff allocation plan by telecommunications sector, staff functioning and assignment should be carried out in accordance with a qualification level and job classification.

(2) Telecommunications Productivity

A study from the world telecommunications development report 1997/1998 issued by ITU shows that the average subscriber line per staff in Vietnam accounts for 55 lines

as of end of 1998. This figure can be defined as a staff productivity. Since Vietnam will basically become an industrialized country by the year 2020, they should enhance the staff productivity more than twice by 2010 and three times up to 2020 through the an effective introduction of new technologies , human resource development , significant efficiency to operation and organization/institution improvement.

(3) Establishment of Standards for Telephone Services

Carriers including VNPT have obligations to build the public telecommunications network under the Vietnam standards and the international standards, set or announced by the DGPT, and to strictly comply with the service quality standards set by the DGPT and the optional service quality standards registered with the DGPT.

To comply with above circulation, it is recommended to set (a) National Technical Standards, (b) Service Quality Standards and (c) Technical Standards such as Fundamental Telecommunications Network Plan.

(4) Operation and Maintenance

By the year 2010, the fixed telephone line and mobile line will increase to about 7.7million and 1.6 million respectively as a result of telecommunications development plan. In proportion to the increase in telecommunications subscribers, the operation and maintenance works will become more sophisticated and diversified. To cope with the tendency, the operation and maintenance works should be simplified and standardized for better performance of works.

On the other hand, the function and responsibility of headquarters and the provincial center must be well balanced in the future.

16.3 Telecommunications Services and Facilities

(1) Fundamental Services and Facility Plan

It is necessary to provide 7.7 million of fixed telephone subscribers and 1.6 million lines of mobile telephone up to 2010 and to expand various kinds of services around the country. To fulfill this target, the following measures should be taken stage by stage for a completion of Mater Plan up to 2010.

Short-term Plan(Phase A up to 2000)

- (a) Basic network: Expansion of present ISDN and development of incumbent services
- (b) Mobile communication: Introduction of Mobile CDMA system
International communication: Introduction of submarine cable system and International ATM
- (c) Non-voice system: Trial introduction o Frame Relay system and ATM and

provision of high speed data communication services

Medium-term Plan(Phase B up to 2005)

- (a) Basic network: To provide promptly the services with subscribers and expansion of regional telecommunications services to meet the demand.
- (b) Transmission/Mobile communication: Enhancement of present inter-provincial trunk lien an introduction of personal communication services
- (c) Access Network: Development of access network by optical fiber cable and introduction of a new radio subscriber system
- (d) International /Non-voice system: Launch of Vietnam own satellite, expansion of internet and TV conference services

Long-term Plan(Phase C up to 2010)

- (a) Basic Network: Universal services throughout the country and introduction of broad band ISDN services
 - (b) Mobile communication: Next generation mobile system IMT-
 - (c) Regional: Completion penetration of telephone services to all villages in Vietnam. (Full coverage of universal service to provide telephone services with all villages " Communes")
 - (d) International/Non-Voice : Introduction of international ATM switch, new telecommunications network control system (TMN) and B-ISDN.
- (2) National Information Infrastructure (NII)

In order for the Government to address itself to Vietnam's National Information Infrastructure (NII), it is indispensable to organize a task force, in which conception and available programs shall be planned and scheduled in Vietnam.

Considering the current situations of education and medical environments in Vietnam , Telemedicine and Remote Education services, optionally adding video conference trials, shall be put in trial, especially in metropolitan areas and the newly planned commercial/industrial areas. Later on, if the universal services would be completed, these two services should be provided at large throughout the country together with a high-speed and broad band transmission network.

16.4 State Management for Telecommunications

(1) Regulations and Policies toward Competitive Telecommunications Market

The pending issues that the government of Vietnam is confronting toward competitive telecommunications market can be classified into "regulations", "industry policy" and " resource administration". In the field of the regulations, there exist the pending

issues on a policy for "Regulatory Issues for Market Entry" accomplishment of "Universal Access", "Standardization", etc.. In an aspect of telecommunication industry development, realization of "National Information and Communication Infrastructure" and development of " Strategic Industry" are key issues to resolve.

(2) Telecommunications Industry Development

To attain targets of industry development plan, it is recommendable to plan required policies of the industry development by dividing following three steps;

Step 1 (2005)

- Implementation of a national telecommunications expansion
- Promotion of education on computer/software,
- Preferential investment in protection of, and development of domestic core companies to manufacture private network equipment and networking equipment manufacturing

Step 2 (2010)

- Establishment of national information infrastructure
- Establishment of software technology parks in several cities in the country
- Introduction of competition into the for private network equipment manufacturing

Step 3 (2020)

- Encouragement of advancement to overseas market for equipment manufacturing companies

(3) Organization and Management Plan

With the licensing for two (2) new Posts and Telecommunications operators and for the purpose of achieving the expansion program for 10 % penetration target (fixed telephone -POTS- and mobile telephone) of the telecommunication development plan up to 2010, the organization and management of DGPT should be strengthened.

(a) For strengthening the DGPT administrative organizations, such as planning, financial investment, accounting, frequency control regulation and inspection for the telecommunications regulations and administration, it is recommended to set up an independent and proper organizations of telecommunications separated from the postal services in DGPT up to 2005.

(b) It may be recommendable to organize a new Communication Policy Bureau as a policy department and Telecommunications Bureau as a regulation department in DGPT.

(4) Spectrum Management

Although frequency is an invaluable resource, the adequate spectrum control is not taken properly. The recommendation items can be summarized as follows;

(a) Frequency Allocation and Reuse

By transition to new service/system, it is better that the aged/superannuated radio systems would be removed, and their radio frequencies would be reused by new services/systems.

(b) Legal Systems

The principal law (Radio Law) for spectrum management shall be completely established as soon as possible.

(c) Frequency Licensing

Illegal users besides the new licensee should be comprehended as soon as possible.

(d) Frequency Monitoring System

To reduce illegal users, available frequency monitoring area should be expanded nation-wide, especially in bordering and mountainous areas.

(5) Numbering Management

(a) Numbering Administration/Transition of Regulatory Body

DGPT planned to open up telecommunication market to outside companies. Under these competitive environment, it is recommended that independent regulatory authority for numbering administration should be established somewhere in DGPT and smooth transition of numbering administration from the State-owned Carrier (VNPT) to the independent regulatory authority (DGPT) should be made.

(b) Number Portability

Number Portability has the aim of improving user convenience and promoting competition between carriers, by assuring user freedom in the choice of carriers. In order to introduce number portability at the earliest juncture, studies should be made involving the participation of the carriers.

PART II

TELECOMMUNICATIONS MANAGEMENT

CHAPTER I STATE MANAGEMENT FOR TELECOMMUNICATIONS = REGULATIONS AND POLICIES TOWARD COMPETITIVE TELECOMMUNICATIONS MARKET =

Chapter I of Part II consists of studies that deal with government policies toward competitive telecommunications market. No attempt could be made here to describe whole vast and complex subject of policy reforms. Rather, this attempts to clarify important elements that are useful for preparing competitive telecommunications market.

Toward establishment of competitive telecommunications market in Vietnam, there are many tasks that the government should solve. Vietnamese government just has been at the start point to transform monopolistic telecommunications market into competitive one. In another word, beginnings of 21st century is the transition period of telecommunications industry from monopoly to competition. The government should prepare necessary regulations and basic policies for smooth transition for competitive telecommunications market. But the government should take step by step approach for this transformation.

Figure 1-1 shows main issues for state management in this transitional period. Issues that Vietnamese government should face are able to be categorized three groups; "Regulations", "Industrial Policy" and "Resource Management".

There is a thought that "Resource Management" overlap "Regulations", but we would like to divide them into two groups for making character of issues clear. For example, there are issues "market entry", "universal access" and "standardization" in "Regulations" group; "national information infrastructure" and "strategic industry" in "Industrial Policy" group; "spectrum management" and "numbering management" in "Resource Management" group.

There are some basic issues below "Regulations", "Industrial Policy" and "Resource Management" groups. Those are "Structure of Regulative and Policy Body", "Structure of Regulation and Policy", "Development of Human Resources and its Management".

Vietnamese government should face those issues and decide solutions for transformation of telecommunications market.

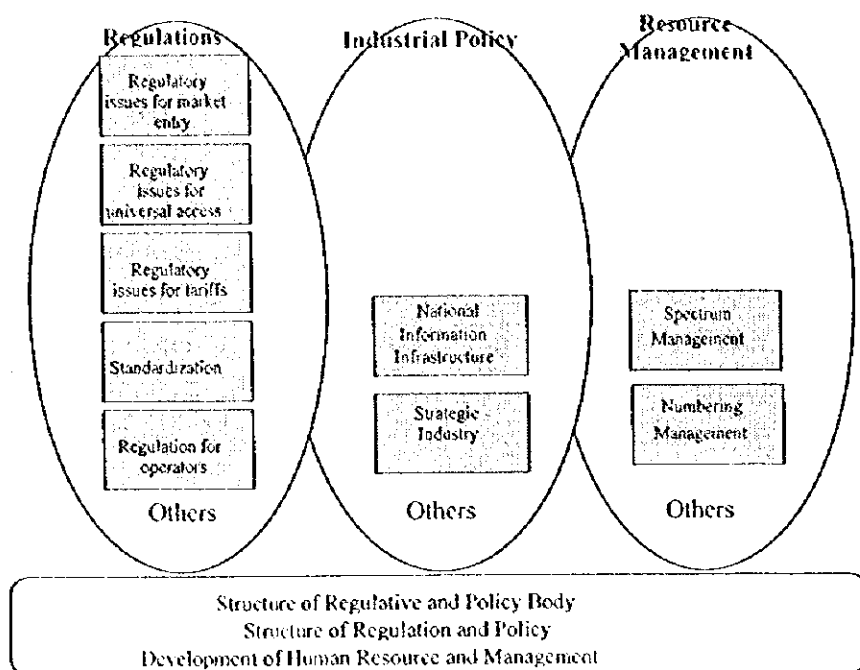


Figure 1-1 Issues of state management

1.1 Outlines of Telecommunications Regulations in Vietnam and Neighboring Countries

Table 1-1 shows situation of competitions in East Asian telecommunications market. It is a bit slow pace to make the markets competitive in Vietnam.

Table 1-1 Competitions in Telecom Service Markets in East Asia

Country	1996 Main Line Penetration Rate (Cellular)	Local	Long Distance	International	Cellular Telephone
Indonesia	2.10 (0.28)	Monopoly	Monopoly	Duo-poly	Competition
Malaysia	18.32 (7.39)	Competition	Competition (3)	Competition (3)	Competition
Philippines	2.58 (1.38)	Competition	Competition	Competition	Competition
Singapore	47.85 (10.25)	Monopoly (2 from 1999)	-	Monopoly (2 from 1999)	Duo-poly (3 from 1999)
Thailand	6.99 (2.50)	Monopoly	Monopoly	Monopoly	Competition (4)
Vietnam	1.58 (0.10)	Monopoly	Monopoly	Monopoly	Competition (3)
China	4.46 (0.56)	Monopoly	Duo-poly	Monopoly	Duo-poly
Hongkong	53.25 (12.97)	Competition (4)	-	Monopoly	Competition
Taiwan	46.60 (4.52)	Monopoly	Monopoly (Planning)	Monopoly (Planning)	Competition (6)
Japan	48.80 (8.15)	Competition	Competition (5)	Competition (4)	Competition (5 + 3PHS)
Korea	43.26 (7.02)	Duo-poly	Competition (3)	Competition (3)	Competition (2 + 3PCS)

1.2 Environment of State Management for Telecommunications

Development of the technology is changing environment of telecommunications market. The biggest change should be transformation of telecommunications market from monopolistic one to competitive one. The government should follow this change.

State management, especially regulations and policies, form competition in the country. Telecommunication's authorities who have crucial role to set up conditions of competition should make framework for regulations and policies that should be designed to restrict anti-competitive movement.

Governments around the world study interconnection and universal service as key issues for competition. They should also think about demerits of competition in service provision to high cost areas.

1.3 Recommendations for Policies and Regulations

After those two sections for general studies, the third section leads to some recommendations for building competitive telecommunications market.

The basis of recommendations is that all policy and regulative settings are complied with "fair and clear" principles, in other words "non-discriminative and transparent". This contains the following recommendations in six fields of regulatory and policy issues; structure of regulative authorities, market entry, universal access, tariffs, standardization, and operators. Materials that could not be categorized in these six fields have been collected in the last part. Recommendation items spreading below include all Key provisions in the "reference paper" on regulatory principles in the 1997 WTO Telecommunications Agreement by direct or indirect manner.

1.3.1 Structure of Regulative Authorities

(1) Re-organization from Department General to Ministry

Vietnamese government should consider to establish new Ministry that is able to handle policies relating with Information Technology by coherent manners. New ministry would be better handle six former different major industry in IT field. These are; Telecommunications Equipment, Telecommunications Network Services, Computer Hardware, Computer Operating Software, Audiovisual Distribution Network, and Audiovisual Content. However, new Ministry does not regulate Contents in Vietnam. Vietnamese government would be better to prepare "Establishment law for new Ministry".

(2) In line with Small Government

When the government considers to organize new IT ministry, the ministry should be small to handle minimum task for the authority. Main task for the new ministry should

be setting the rules of the game. This setting will prepare core of "fair and clear" principles.

(3) Separation of Regulative Authority from Policy Decision Body

The government should establish policy decision body and regulative authority separately. There is a need for mediation by disinterested party to judge problems that brings conflict of interests between implementation of industrial policy and regulation. At least, regulative authority division separates from policy decision division for the preparation of organizational change.

1.3.2 Regulatory Issues for Market Entry (Licensing and Interconnection)

(1) Number of Licenses

The regulatory authority should set fair and clear criteria for decision of the license issuing and make the number of licenses clear. That information is crucial for decisions of market entry.

Controlled competition is desirable in low penetration rate stage, under 15 - 20 lines per 100 persons. Duo-poly competition would be appropriate as penetration rate is below 10 lines per 100 persons. For example ideally, there are two or three long distance service licenses (including international gateway), two fixed line local service licenses and two mobile local service licenses in general. There would be a possibility to issue additional licenses for high penetration city areas, like Ha Noi and Ho Chi Minh City.

(2) Agreement for Interconnection

In order to realize clear and fair interconnection, making a check list for competition and interconnection is useful. Check list should include following items;

- Equal access for subscribers,
- Access to the incumbent's numbering information,
- Reasonable interconnection charge,
- Location of point of interconnection (including Co-location),
- Non discriminative access to unbundled network components,
- Unbundling among trunk route, local exchange and local loop,
- Access to information concerning the incumbent's network,
- Protection of new operator's information,
- Determination of adequate technical standards and interfaces, and
- Non-discrimination on quality of service and price for interconnection.

It would be better that interconnection issue be addressed through the decisions of the regulatory body to keep flexibility for technological development, but those decisions should be fair and clear (see next recommendation).

(3) **Transparent Procedure for Interconnection**

Regulative authority should establish transparent procedure for interconnection among telecommunication service providers and promulgate the procedure to the public.

(4) **Reselling**

There is a need for specific regulation for interconnection between public network operator and reselling operator or private network. The regulator also decides how to allow interconnection between public and reselled network.

1.3.3 Regulatory Issues for Universal Access

(1) **Definition of Universal Access**

The policy authority should establish definition of universal access, based on the information gathered and the relation between income and tariffs. The definition includes what features and services are included in Vietnamese universal access policy. Then, the authority should set an objective of universal access indicators. The indicator includes three criteria, population, distance and time.

(2) **Expansion of Universal Access in Vietnam**

(a) **Geographical extension**

The policy authority should realize nation wide coverage of telecommunications service with the notion of universal access by variety of policy tools. The notion of universal access is ranged from individual service to a broader coverage of the population and from a telephone in every house hold to community access.

(b) **Economically disadvantaged or physically disabled**

The policy authority should extend universal access to economically disadvantaged or physically disabled peoples for realizing social equality. It should be an important step to "universal service".

(3) **Universal Access Obligation for New Entrants**

The regulator would be better to consider that the new entrants in profitable sector owe some extent of Universal Service/Access Obligation as well as incumbent operator.

(4) **Funding Universal Access**

Universal service/access fund is one of the most effective way for funding. However, the whole system of universal access could not be covered only by universal service/access fund. The policy decision body should combine universal access fund with other means for funding universal access.

(5) **Endowment of Match up Project**

Realizing universal access to remote rural area, the policy authority could consider to match up telecommunication development project with other authorities' project, e.g. education, health care etc. in this technological converging age.

1.3.4 Regulatory Issues for Tariffs

(1) Collection of Business Information and Establishment of Accounting Rule

The regulatory authority should collect necessary information for the regulatory decision making process. Especially, effective tariff setting requires comprehensive business information about the category I and category II basic telecommunications service providers. Common accounting system for those operators prepares the basis for collecting information.

(2) Tariff Rebalancing

The regulatory authority should plan tariff rebalancing that decrease dependency to international revenue and increase revenue from domestic traffic.

(3) Incentive Regulation for Tariff

The regulatory authority should consider to develop rate regulation from "rate of return" structure to "price cap" structure for promoting efficiency of telecommunications service operators. The regulative authority should consider major loop holes of price cap regulation when the regulation will be implemented.

(4) Long Term Incremental Cost

The regulator have to set up an internal study team for "cost" of telecommunications services to implement cost base tariff regulation. The notion of the "cost" affects style of competition. The study team would intensively focus on the treatment of "Long term incremental cost", as a type of forward looking cost, which becomes dominant notion in the competitive markets.

Circular No. 3/1999/TT-TCBD, hereafter Circular 3/99, is an important step to realize cost based tariff regulation. For further step ahead to competitive market, the regulative authority should decide which cost will be used to calculate tariff and charge, "historical - full cost principle" or "forward looking - long term incremental cost principle".

(5) Arrangement of International Accounting Rate

The regulatory authority should continue to adjust international accounting rate to cost-oriented level. Disclosing adjustment plan would be desirable for international negotiations, such as WTO Basic Telecommunications Agreement.

1.3.5 Standardization

(1) Strengthening Standardization Program

The regulator would be better to make a plan to establish its own laboratory facilities to examine certification process. A practical future vision for the standardization program in Vietnam will have to be clarified under which the necessary human resources and financial assistance are prepared.

(2) Expansion of "de facto" Standardization and Mutual Recognition Agreement

The regulatory authority would designate specific technical areas to promote procedure of "de facto" standards. With an adoption of "de facto" standards, the regulatory authority should consider acceptance of Mutual Recognition Agreement in specific technical standards at first, such as Global Mobile Personal Communications System (GMPCS). The regulatory authority should also consider how Vietnamese government accept APEC's "Mutual Recognition Arrangement for Conformity Assessment of Telecommunications Equipment", such as legislation for coordinating MRA and domestic standards.

(3) Type Approval for Customer Premises Equipment

The regulator should simplify type approval of Customer Premises Equipment and manage its procedure. It also important for the future co-operation to harmonize type approval procedures with other members of international organization.

1.3.6 Regulation for Operators

(1) Regulation on Incumbent Carrier

For realizing "fair and clear" competition, the regulatory authority should limit bargaining power of incumbent operator. It would be effective to make check list for competition and to direct incumbent operator rationalizing management.

While imposing limitation on incumbent carriers, the regulator should consider providing the compensation for Universal Service Obligation to the incumbent as well. Furthermore, the policy making body also consider how to raise national flag carrier in this penetration rate stage, from 2 to 10 per 100person.

(2) Preparation for Unbundling Network Elements

It is the first step to unbundle telecommunications network for competitive access, that incumbent operator should separate each financially independent subsidiaries' accounting and disclose those balance sheets to the regulator. This business development is very crucial for fair and clear circulation of cost-based interconnection charges.

The regulator should establish the procedure for unbundling network elements foreseeing cost-based interconnection charges. Circular 3/99 should be recognized as an important step to realize unbundling network elements.

(3) Separation of Postal and Telecommunications Business

The regulatory authority should consider structural separation of postal and telecommunications business. At least, there is a need for financial separation of posts from telecommunications business.

(4) Regulations for Relatively New Services

There is a need of coherent "Telecommunications Business regulation". The start point of that regulation is to establish common accounting rules for telecommunication service providers. The regulator should prepare Decisions or Decrees for new services, i.e. Mobile Communications regulation, Multimedia regulation including Cable Television regulation for stimulate telecommunications market.

(5) Protection of Customers

(a) Outgoing

To prevent sudden discontinuing service providing, the regulator should establish legal articles for entering into and outgoing from the market of the business organizations.

(b) Quality of the service

From the view point of customer protection, the regulatory authority would be better to establish a system that force operator to report quality of service. Parameters should be reported at the beginning are: call success rates; network faults per line per annum; provision of service, in terms of time to provide, and completion by agreed date; fault repair, in terms of time to clear; delay on directory enquiries service and operator services; and public payphone serviceability.

1.3.7 Other Policy and Regulatory Issues

(1) Legislative Framework

The government should arrange structure of legislative documents, those are Law, Decree, Decision and Circular. The government and the parliament should continue to make effort to legislate "Post and Telecommunications Law" for fair and clear competition.

If it matches with current legal framework to add "Guideline", the regulative authority would be better to consider to use that new category of legislative documents for regulating frequently altering matters, like standard for services or calculation for tariff setting.

(2) Relations between Domestic Regulations and International Agreements

The regulative authority should make clear relation between domestic regulations and international agreements.

(3) Foreign Ownership

The regulative authority should specify limitation for foreign ownership by descriptions.

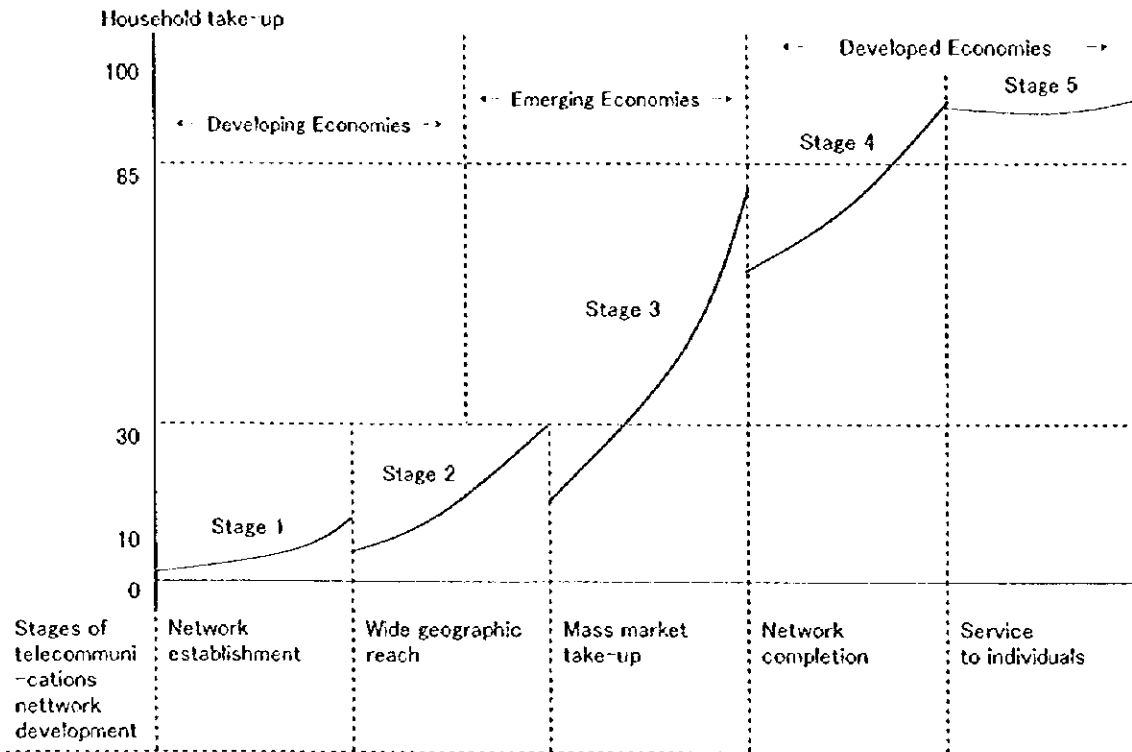
(4) Regulation for Cyber Space and Stimulation of IT Industry

The regulative authority and the policy decision body would be better to start considering how cyber space should be regulated and how IT industry should be promoting. There are some issues to tackle immediately, these are regulation and development plan of Electronic Commerce, establishment of computer crime act accordance with new Civil Law, and determination for the extent of government intervention to cyber space including content control.

CHAPTER 2 TELECOMMUNICATIONS INDUSTRY DEVELOPMENT

2.1 Evaluation of Telecommunications Industry in Vietnam

Telecommunications industry in Vietnam is now at Stage 1 shown in Figure 2.1-1.



Source: Milne, C Paper for the 25th annual Telecommunications Policy Research Conference, September 1997

Figure 2.1-1 Five Stages of Telecommunications Industry Development

The problems that need to be considered in discussions of the industry's future in Vietnam are as follows;

- (1) The telecommunications service industry has not yet achieved its purpose of establishing a network using the latest international-standard telecommunication facilities.
- (2) The telecommunications equipment industry has just introduced a domestic production system on a joint venture basis. Most of VNPT's subsidiaries remain at a position that merely complements joint venture companies in the field of manufacture and maintenance of copper cables and microwave equipment.
- (3) The size of the market for products of the information and communications industry is still quite small.

- (4) For both hardware and software, the computer industry is still in its early stage.
- (5) State enterprises haven't developed to a point requiring information transaction or goods distribution networks, utilizing telecommunications infrastructure and developing new applications.

2.2 Impacts of Innovation on the Information and Communications Industry

The innovations in network and computer technologies have had three major impacts on the information and communications industry.

- (1) Intensified Competition in the Telecommunication Market
- (2) Advanced Globalization
- (3) Emerging New Business due to a Broader Range of Needs in Information and Communications and Industrial Convergence

2.3 Global Trends of Telecommunications

2.3.1 Telecommunications Industry Trends

Global telecommunications industry trends may be summarized into the following eight points.

- (1) Due to high level of integration and programmability, the costs of equipment are dramatically decreasing.
- (2) Conformity of standards to ensure interoperability and seamless operation of networks is removing the network boundaries.
- (3) There is a shift from hardware/technology based platform to software/marketing based platform.
- (4) There is a progressive migration to multimedia services and information infrastructure, Internet. Many telecommunications administrations and research labs are engaged in Internet telephony projects.
- (5) Need for establishment of national, regional and global information infrastructure is getting great.
- (6) Trading in telecommunication services is becoming an accepted norm.
- (7) Review of accounting rate mechanism is being seriously pursued. The Internet traffic is occupying the circuits for longer than ordinary telephony. Much of the content providers are in the U.S.
- (8) GMPCS (Global Mobile Personal Communication Systems) are likely to become operational between 1999 and 2002 which will make it technologically possible to bypass the national gateways.

2.3.2 Trends of Telecommunications Equipment Manufacturing Industry

Future trends in the telecommunications equipment manufacturing industry based on technological innovations may be summarized into the following five points.

(1) **Lower Prices in the Terminal Equipment Domain**

(2) **Increases in the Demands for Private Network Elements and Networking Equipment**

The market for telecommunications equipment is shifting from public networks to private networks, particularly rapidly from conventional public switching and transmissions to the emerging networking equipment. Although the market for public switching and transmission is not expected grow at all for the next 10 years, that of networking equipment is expected to triple during the same period.

(3) **Progress of Convergence of Telecommunications and Computer Industries**

A shift from circuit switch networks to computer networks is rapidly progressing in the telecommunications equipment industry in the form of information technologies developed via Internet for computer networks edging out into the "old world," or vintage circuit-switching networks.

(4) **Increase of Software used in Network Elements**

(5) **Increase of Software used in the Customer Related Application Packages**

2.4 Implications for the Development of the Telecommunications Industry in Vietnam

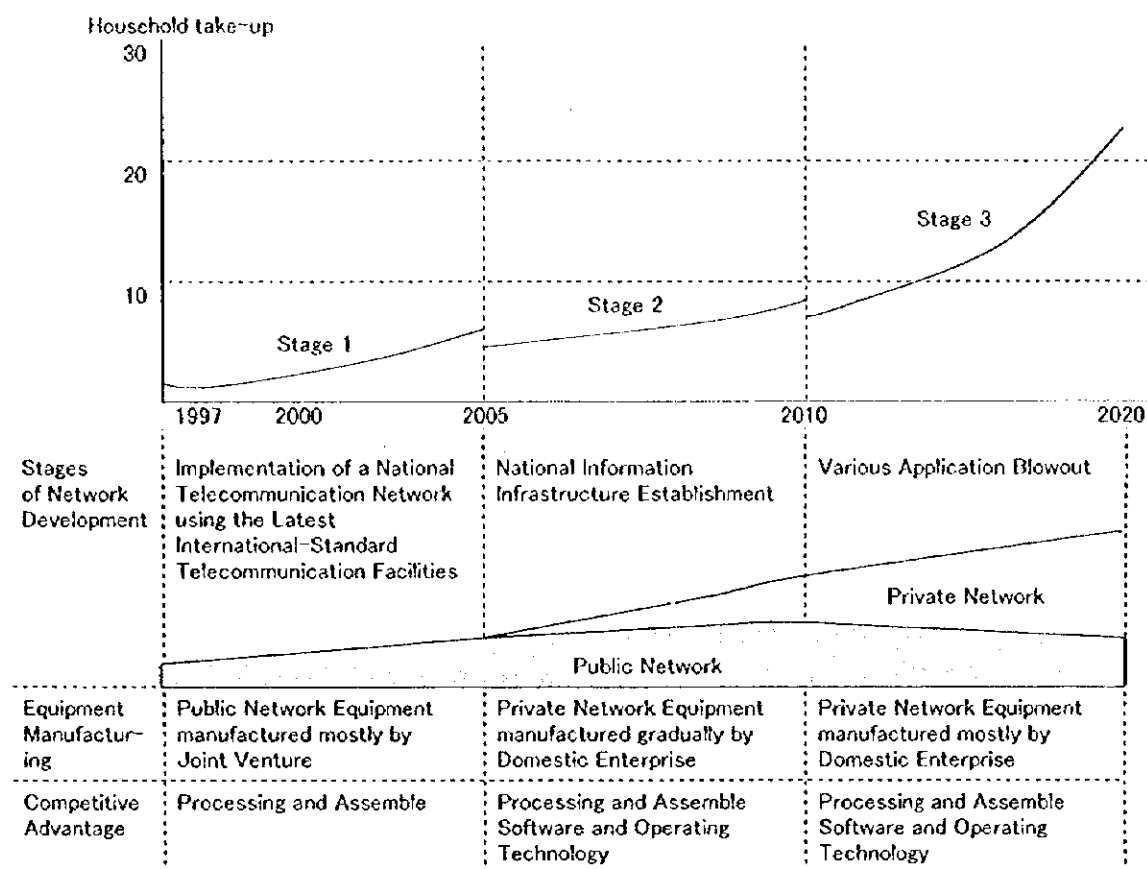
The rapid progress of telecommunications technology is by no means a disadvantage for Vietnam, where the development of a telecommunications industry has been delayed. On the contrary, the selection of appropriate policies may allow Vietnam to drastically improve its communications efficiency.

One of the most important advantages for Vietnam is its potential ability to make a paradigm shift to a country with an advanced information industry by skipping whole stages of development, though in order to do so, it must implement appropriate policies.

2.5 Roadmap for the Development of Telecommunications Industry in Vietnam

2.5.1 Three Stages of Telecommunications Industry Development in Vietnam

Based on the evaluation of telecommunications industry in Vietnam and global trends of telecommunications, Figure 2.5.1-1 shows the three stages of development of a telecommunications industry, assuming that Vietnam becomes an industrialized country by 2020.



Source: InfoCom Research, Inc JAPAN

Figure 2.5.1-1 Three Stages of Telecommunications Industry Development in Vietnam

2.5.2 Targets for the Development of Telecommunications Industry in Vietnam

Targets that must be attained by 2005, 2010 and 2020 are as follows;

2005

- Establishment of a system for joint ventures to supply most public network elements
- Development and accumulation of software and operating technologies
- Improvement of the domestic supply system for private network equipment and networking equipment manufacturing with a subsidiary company of VNPT (e.g., VITECO) as a key member

2010

- Establishment of a domestic supply system for private network equipment and networking equipment manufacturing by applying software and operating technologies, and improvement of the consignment production system for networking

equipment in collaboration with foreign enterprises

2020

- Manufacture of networking equipment using the software and operating technologies developed by Vietnam and supply to overseas markets

2.5.3 Required Policies

To attain targets by 2005, 2010 and 2020, required policies are as follows;

2005

- Implementation of a national telecommunications network using telecommunications facilities that meet the latest international standard
- Promotion of education on computer/software
- Preferential investment in, protection of, and development of domestic core companies to manufacture private network equipment and networking equipment manufacturing
- Preferential taxation system for investment in information technologies and systematization of companies

2010

- Establishment of national information infrastructure
- Establishment of software technology parks in several cities in the country
- Introduction of competition into the markets for private network equipment and networking equipment manufacturing

2020

- Encouragement of advancement to overseas markets for private network equipment and networking equipment manufacturing companies

CHAPTER 3 ORGANIZATION AND MANAGEMENT PLAN

This Chapter describes firstly the present situations on organization/institution and management of telecommunications sector in Vietnam. Secondly, based upon the important and urgent recommendations obtained by the study results, the improvement items for organization and management plan on Vietnam's Telecommunications Sector are proposed.

3.1 Present Status on Organization and Management of Telecommunications Sector

3.1.1 Present Status of Regulatory Body and Operators

(1) Regulatory Body

DGPT is the State Regulatory body to administrate the nation-wide postal services and telecommunication services as well in accordance with Vietnamese government laws and regulations.

There are about 400 employees (most of them are highly educated) in DGPT including Postal and Telecommunications organizations.

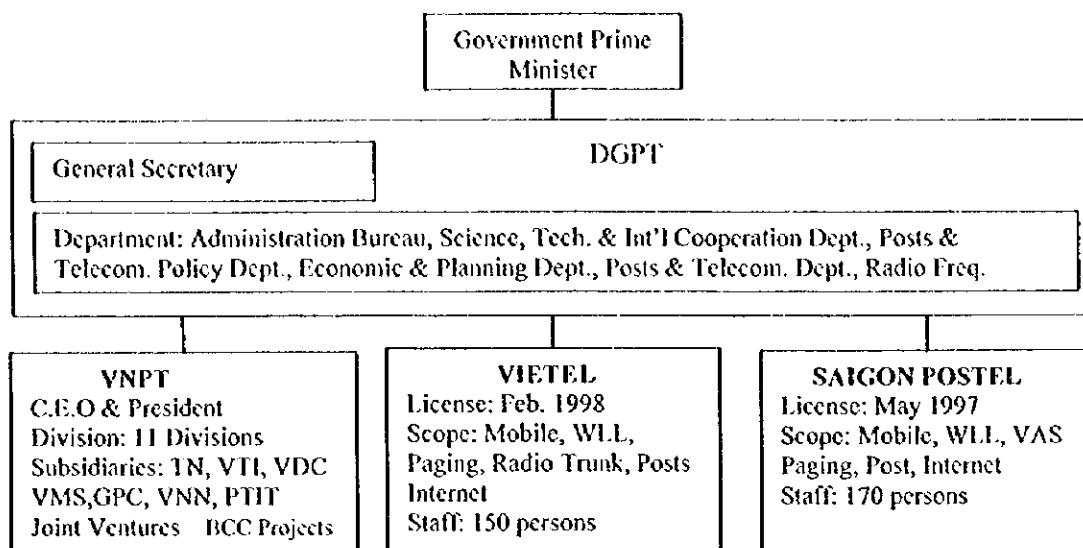
(2) Telecommunications Operators

Vietnam Posts and Telecommunications (VNPT) is organized as a State Entity in 1995 in accordance with Vietnamese laws and regulations. Besides VNPT, VIETEL and SAIGON POSTEL are allowed to deal with the national Posts and Telecommunications services.

The scope of business of non-VNPT companies is regulated by DGPT, and the two companies start their official business in 1999.

In VNPT, there are about 40,000 telecommunications employees and about 150 staffs for VIETEL and about 170 for SAIGON POSTEL.

Relationships of the State Regulatory body and organization and business activities of three (3) Operators are illustrated in Figure 13.1.1-1.



Source: DGPT

Figure 3.1.1-1 Present Organization of Telecommunications Sector in Vietnam

3.2 Recommendation

3.2.1 Fair Competition and Strengthening of DGPT Administration

With the licensing for two (2) new Posts and Telecommunications operators and for the purpose of achieving the expansion program for 10 % penetration target (fixed telephone - POTS- and mobile telephone) of the telecommunication development plan up to 2010, the organization and management of DGPT should be strengthened.

- (1) For strengthening the DGPT administrative organizations, such as planning, financial investment, accounting, frequency control regulation and inspection for the telecommunications regulations and administration, it is recommended to set up an independent and proper organizations of telecommunications separated from the postal services in DGPT up to 2005.
- (2) It may be recommendable to organize a new Communication Policy Bureau as a policy department and Telecommunications Bureau as a regulation department in DGPT. The functions of these new organizations are described in the followings:

Communication Policy Bureau

Communication today is developing at an unprecedented rate toward a diversification and sophistication until recently almost beyond the imagination. Taking up the change

of this new era, for example, a new organization named by "Communication Policy Bureau" must employ its expertise and resources to guide the future development of new telecommunication in the most promising directions in DGPT.

Telecommunications Bureau

Building an advanced telecommunications society in the future in Vietnam which is vigorous and flourishing will require the realization of various measures to foster and promote the telecommunications business and stimulate radio applications.

It is necessary to establish a new organization called, for example, as "Telecommunications Bureau". This bureau should be charged with actively pursuing effective means of achieving these goals. The new organization should be also responsible for regulating the telecommunications business in accordance with the applicable laws as well as for guiding and supervising the activities of telecommunications operators and overseeing radio communications.

3.2.2 Project Administration and Management

(1) Project Implementation

The formulation of Telecommunications Development Plan can be considered as one of the projects on the mutual cooperation between Vietnam Government and foreign partner. To make the project be more effective and more fruitful, it is recommendable to set up a so-called "Project Steering Committee" and to adopt a plan-do-check – action method in order to supervise the overall project implementation by use of such tools of check sheet, diagrams, charts and a various kinds of graphs, as described in Part I Chapter 12.

(2) Role of DGPT for Information Society-IT and NII

The DGPT will coordinate a national steering committee (for example, IT 2000 or NII: all are governmental national programs) through a secretariat to facilitate future efforts with respect to implementation of a national project IT or NII strategies. This steering committee must be chaired by DGPT and comprises representatives from MPI, DGPT, Universities, and private sectors firms in telecommunication and information technology.

3.2.3 Information and Management Organization

The official statistic data and information which will be released and disclosed to the public and utilized among operators and related companies should be standardized and uniform so that the parties concerned can share the resources in common. In parallel with

this, it will be recommendable to provide a standard documentation with parties concerned in order to make the any project more effectively and more smoothly.

3.2.4 Organization and Management for New Information Industry Society

When a new era of multimedia society will come, the current industries of communication, electronics/computers and broadcasting will be converged into an info-communication industry to further improve the industry performance and effectiveness.

In this connection, a majority of government of the countries in the world, restructuring of the government body itself has carried out.

To cope with this trend effectively and smoothly, some organizations and institutions of Vietnam may be rebuilt and be integrated into a combined organization of the government organization.

One of the typical forms in China for this reorganization can be shown in Figure 3.2.4-1.

Because, the restructuring of the government ministries in China was executed in April 1998 to cope with the innovation in new info-communications industry.

In this case, three ministries have been integrated into new Ministry of Information Industry, as shown in the figure.

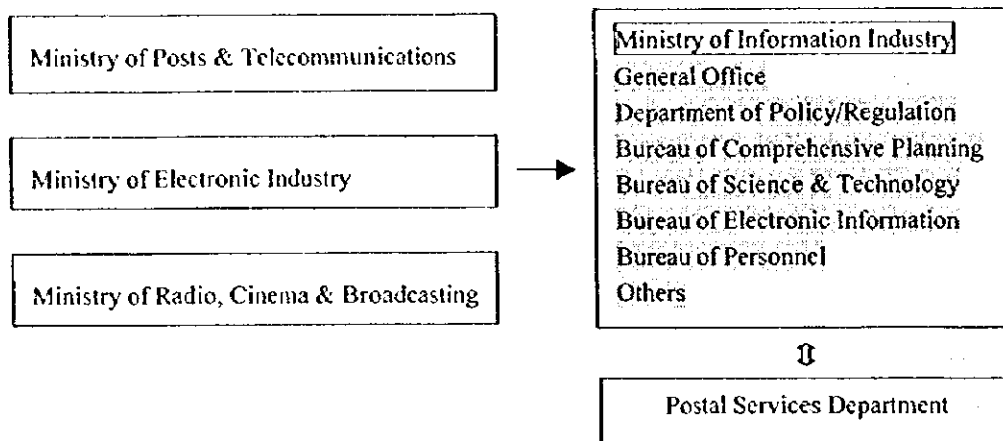


Figure 3.2.4-1 Example of New Info-Communication Ministry

CHAPTER 4 SPECTRUM MANAGEMENT

4.1 General

In proportional to the growth and expansion of economic and social activities, the radio frequency utilization is dramatically increasing in Vietnam. The improvement and expansion of spectrum management functions/organization are indispensable. In this Chapter, the present conditions of spectrum management were investigated and some issues to be solved are pointed.

4.2 Frequency Allocation and Reuse

4.2.1 General

The DGPT has built and completed the strategy on dividing and using of radio frequencies, planning of channels and reuse of frequencies so as to ensure united State management and effectiveness of the national resource within the framework of the international frequency allocation decided by the ITU.

The radio frequencies have been allocated to the various services based on the Radio Regulations in Vietnam.

4.2.2 Specific Frequency Allocation

The allocation of the specific radio frequency bands for CMTS, radio subscriber systems, local satellite network, etc. have been stipulated in detail in "DECISION No. 85 in 1998. The allocation of these bands should be re-considered from the overall viewpoints including future demand. These issues to be solved are pointed out and some improvement are recommended.

4.3 Spectrum Control

4.3.1 Legal System

The present situation of legal systems is as follows:

(1) **Radio Law**

As a principal law for the spectrum management in Vietnam, a radio law has not yet been completed.

(2) **Radio Standard**

It is required to build Vietnam's radio standard system to ensure that all of imported equipment is uniform and cause no interference, and to save radio frequencies. At present, the radio standard system has not yet been completed.

(3) Radio Registration System

It is necessary to build the registration system and coordinate with international frequency to protect national frequency utilization.

The necessary measures for this matter have already been taken and completed to build them.

(4) Decisions concerned to Spectrum Control

To effectively execute the spectrum control in Vietnam, decisions regarding spectrum control have been established.

4.3.2 Organization

(1) Organizations for Spectrum Management

(a) Radio Frequency Department (RFD)

The spectrum management is mainly carried out by the Radio Frequency Department (RFD) of the DGPT.

(b) Radio Frequency Committee

The Radio Frequency Committee has the following roles and rights:

- i) Formulation of strategic plan
- ii) Coordination between governmental organizations / private users
- iii) Spectrum management and supervision

(2) Staff

The total number of the RFD staff is approximately 280. In each monitoring center, about 30 staff are deployed and engaged in monitoring work. (Hanoi and Ho Chi Minh City: 35 – 40 staff each)

4.3.3 Spectrum Control Activities

The following spectrum control activities stipulated in ITU-R SM 1048 have been carried out by the RFD in Vietnam.

- (1) Record Keeping
- (2) Frequency Assignment
- (3) Border Coordination
- (4) Notification to the Radiocommunication Bureau (BR)
- (5) Licensing Fees and Fee Collection
- (6) Monitoring
- (7) Equipment Approval Process
- (8) Reports Generation
- (9) User Interface

4.4 Frequency Monitoring System

4.4.1 General

The DGPT has a plan to improve frequency-monitoring system for inspecting and controlling of radio frequencies as follows:

- (1) Eight (8) monitoring centers
- (2) 24 fixed control stations
- (3) 16 travelling vehicles

Also, the DGPT has the following targets for improvement of frequency monitoring system:

- (1) To control 100 % of key areas by the year 2000 to keep security in radio frequency using
- (2) To regularly control at least over 50 % of the territory to keep security in radio frequency using

4.4.2 Frequency Monitoring Area

At present, there are seven (7) monitoring centers (Hanoi, Ho Chi Minh City, Hai Phong, Da Nang, Vinh, Nha Trang, Can Tho) for frequency monitoring in Vietnam. In the near future, one (1) monitoring center will be added in Yen Bai.

4.4.3 Facilities and Equipment for Frequency Monitoring

The facilities and equipment for frequency monitoring are as follows:

- (1) Monitoring centers
In seven (7) monitoring centers, the monitoring systems are deployed.
- (2) Semi-Fixed Equipment
The semi-fixed monitoring system is tentatively used as same as fixed monitoring center in a short/medium term.
- (3) Mobile Monitoring Vehicle

Table 4.4.3-1 Deployment of Monitoring Systems

Type / Equipment	Ha Noi	Hai Phong	Vinh	Da Nang	Nha Trang	Ho Chi Minh	Can Tho	Yen Bai
Monitoring Center	○	○	○	○	○	○	○	Planned
Semi-fixed Equipment			○	○	○		○	
Mobile Monitoring	○					○		
VHF/UHF Receiver	○		○	○	○	○	○	
Spectrum Analyzer	○	○	○	○	○	○	○	
Telecomm. Test Set	○		○	○	○	○	○	
Direction Finding System	○		○	○	○	○	○	
Frequency Counter	○	○	○	○	○	○	○	
Hand Direction Finding	○		○	○	○	○	○	
Other Equipment	GPS							
Computer	○ WS/PC	○ PC	○ PC	○ PC	○ PC	○ PC	○ PC	

Source: DGPT, Note: ○ : Deployed

The vehicles would be used as mobile monitoring systems at a location, where the monitoring work is required.

The monitoring systems mentioned above are deployed in Vietnam as shown in Table 4.4.3-1.

4.5 Frequency Licensing

4.5.1 Procedure for Frequency Licensing

(1) Classification of Applicants

Frequency licensing procedures are classified into two (2) types, i.e., Class-1: A user is required to obtain an operator license, Class-2: A user is required to obtain only frequency license.

(2) Licensing Procedure

The radio frequencies are assigned to the users by the RFD in Hanoi according to the following procedure:

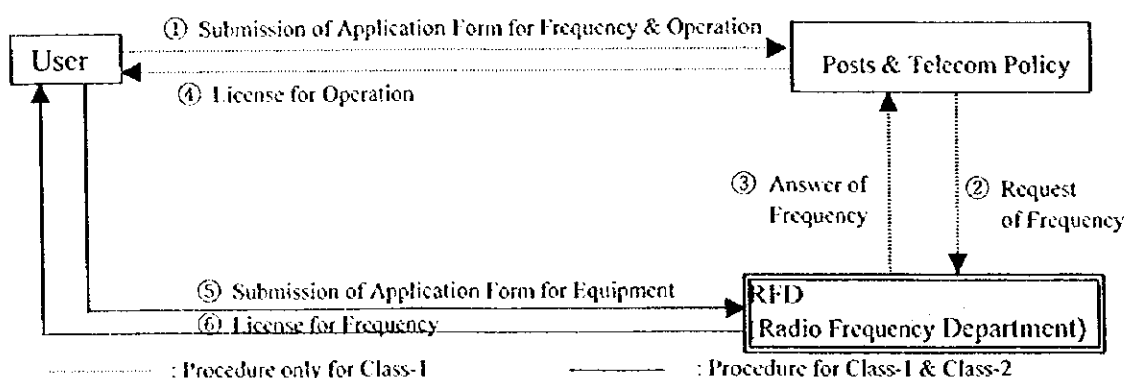


Figure 4.5.1-1 Procedure of Frequency Licensing

4.5.2 License Fee and Spectrum Utilization Fee

The fees regarding radio frequency utilization consist of the following two (2) fees; License fee and Spectrum utilization fee.

(1) License Fee

License fees are decided category by category, and the maximum expiration of license is two (2) years.

(2) Spectrum Utilization Fee

Spectrum utilization fees are also decided in detail category by category. The spectrum utilization fee is applied annually.

4.5.3 Present Situation of Frequency Licensing

At present, the numbers of licensees and licensed stations are summarized by category in Table 4.5.3-1. However, there are many radio facilities and equipment without the DGPT's control and license.

Table 4.5.3-1 Number of Licensees

As of September 1998

Category	No. of Licensees	Remarks
HF and VHF	13,000	
UHF	5,000	Including mobile
Microwave	4,000	
Broadcasting Stations	150	
Earth Stations	110	

Source: DGPT

4.6 Recommendations regarding Spectrum Management

These issues to be solved are pointed out and some improvements are recommended herein.

(1) Frequency Allocation and Reuse

(a) General Aspect

The radio frequency allocation/allotment has been established complied with the Radio Regulations and is being carried out adequately in Vietnam.

(b) Reuse of Radio Frequencies

The reuse of radio frequencies should be carried out from the following viewpoints:

- i) Transition to new services/system
- ii) Reuse by area
 - Two-frequency system
 - Reuse pattern
 - Allotment to zones

(c) Specific Allocation

i) Radio frequency bands for CMTS

The allocation of these frequency bands should be re-considered from the overall viewpoints including future demand.

ii) Radio frequency bands for radio subscriber systems

The wider radio frequency bands should be properly allocated and assigned to radio subscriber systems (radio telephony access systems) in remote and rural areas, or in urban areas as supplemental access system in Vietnam.

iii) Radio frequency bands for local satellite network

The radio frequency bands for local satellite network should be carefully allocated considering the following items:

- To keep good system performance considering rainfall attenuation
- To avoid interference with terrestrial microwave systems

iv) Other services

The radio frequency bands for other services such as cordless telephone, taxi radio and radio security system should be carefully allocated to avoid interference with other systems.

(2) Spectrum Control

(a) Legal Systems

i) The principal law (Radio Law) for spectrum management shall be completely established as soon as possible.

ii) Radio registration system

The radio registration system should be adequately put into practice.

iii) Technical regulation and standard

The regulations and standards regarding transmitter power, occupied bandwidth, antenna to be applied shall be established as soon as possible.

iv) Other legal system

Other than the above legal systems regarding spectrum control, the necessary legal systems should be established corresponding to the introduction of new services.

(b) Organization

Experienced staff regarding spectrum management shall be deployed through training and/or assistance by expert.

(c) Spectrum Control Activities

i) Record keeping

The detailed utilization conditions of the existing users can't be completely

comprehended by the DGPT.

ii) Computerization

Not only technical computation such as interference calculation, but also computerization of administrative work should be carried out in order to perform effectively and smoothly the spectrum control activities.

In addition, the networking of computers will enable to utilize databases nation-wide, and improve the spectrum control activities.

(3) International Frequency Coordination

As international frequency coordination, the following activities should be carried out:

(a) Orbit Position for Geostationary Satellite

The orbit position for geostationary satellite should be ensured through the international frequency coordination.

(b) Frequency Register and Coordination

(c) Border Coordination with Neighboring Countries

(4) Frequency Licensing

(a) Extinction of Illegal Utilization

Illegal users besides the new licensee should be comprehended as soon as possible.

(b) Subsidiary by License Fee and Spectrum Utilization Fee

The license fee and spectrum utilization fee should be utilized to improve the spectrum control in Vietnam as well as in Japan.

(c) Modification of Licensing Procedure

The frequency licensing procedure would be modified according to the method of licensing application such as introduction of online application and FD based application.

(5) Frequency Monitoring System

(a) Frequency Monitoring Area

To reduce illegal users, available frequency monitoring area should be expanded nation-wide, especially in bordering and mountainous areas.

(b) Facilities and Equipment for Frequency Monitoring

To cover the target areas for frequency monitoring, facilities and equipment should be improved in quantity and quality.

CHAPTER 5 NUMBERING MANAGEMENT

5.1 Numbering Administration Under Competitive Environment

DGPT planned to open up telecommunication market to outside VNPT. Under these competitive environments, independent regulatory authority for numbering administration should be established somewhere in DGPT and smooth transition of numbering administration from the State-owned Carrier (VNPT) to the independent regulatory authority (DGPT) should be made.

5.2 Guideline of Numbering Plan

On November 12, 1997 the Government promulgated Decree No. 109/1997/ND-CP on Post and Telecommunications. The DGPT guides the implementation of the provisions on telecommunications networks and services in Circular No.04/1998/TT-TCBD. In this Circular, the DGPT recognizes and manages the Numbering as follows;

- (1) The telecommunications services-providing enterprises shall have to:
 - Participate in the elaboration of the national numbering plan;
 - Carry out procedures applying for codes and numbers according to the regulations of the DGPT;
 - Draw up plans for the use of area codes and numbers allocated by the DGPT according to the national numbering plan;
 - Report on the plans and situations on the use of codes and numbers to the DGPT periodically once every six months and extraordinarily when requested.
- (2) The management, allocation, and use of codes and numbers of public telephone networks shall comply with the "plan for numbering the public telephone networks of Vietnam" promulgated together with Decision No.585/QD-CSBD of the DGPT on May 11, 1995.
- (3) The DGPT shall manage and decide the allocation of initial numbers of domestic and international calls, area codes, network codes, service codes, signal location codes, the length and number range of subscription numbers. The services-providing enterprises shall elaborate plans and designate the subscription numbers in the allocated number range.

5.3 Numbering Plan under the Competitive Environment

5.3.1 Fixed Telephone Service

At present, a numbering structure for fixed telephone service is as follow;

Trunk Prefix (0)+ Area Code (1,2 or 3Digits)+ Subscriber Number (7 or 6digits)

0 + 4 + XXXXXXX (Ha Noi)
0 + 31 + XXXXXX (Hai Phong)
0 + 350 + XXXXXX (Nam Dinh)

Present allocation of area code should be maintained and strings of digits following trunk prefix plus area code need to be used commonly among the carriers.

As for the block size of numbers to be allocated to each carrier, ten thousand (4 digits) seems to be appropriate, if competitive carrier's entry is allowed in the fixed communication market.

Example:

0 + 4 + XXX₁ + XXXX (Hanoi: VNPT)
0 + 4 + XXX₂ + XXXX (Hanoi: New Carrier)
0 + 31 + XX₁ + XXXX (Hai Phong: VNPT)
0 + 31 + XX₂ + XXXX (Hai Phong: New Carrier)

5.3.2 Cellular Mobile Communication Service

At present the numbers of "09X" (X=1, 0) plus six (6) digits are used for cellular mobile communication service. "9X" following trunk prefix "0" can be regarded as the area code whose area is nationwide and also regarded as the identification code for mobile communication services.

The digit "X"s should be designated to each competitive carrier in such a manner as those are designated for fixed communication service. At present "90" is used for VMS (MobiFone) and "91" is used for GPC (VinaPhone). The block size of numbers to be allocated to each carrier could be larger than that of fixed communication services, as separation loss is eased in the mobile networks.

5.3.3 Long Distance Service and International Service

In case that carriers enter the long distance service and/or international service, Carrier Identification Code (CIC) should be designated to each carrier in order for users to select a carrier for their calls.

In general followings are the dialing procedures to select a carrier using CIC;

Long distance service

CIC + trunk prefix(0) + area code + Subscriber Number

International service

CIC + international prefix(00) + country code + national number

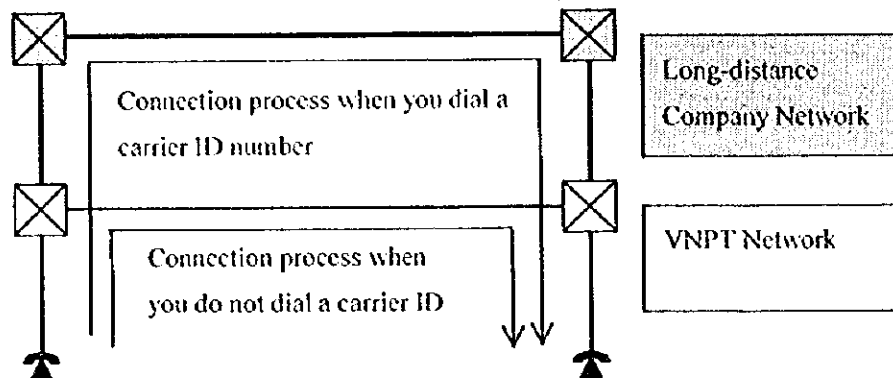


Figure 5.3.3-1 Connection Process between Carriers

For long distance calls, dialing of CIC in addition to the present dialing, which seems to be inconvenient for the users being accustomed to dialing without CIC, becomes necessary. Carrier pre-selection, which is a function provided by a local carrier for connecting carrier, enable users to make a call through the connecting carrier without dialing it's carrier ID, if the users registered the connecting carrier beforehand to the local carrier.

5.3.4 Number Portability

Number portability (portability between carriers) means that users will be able to continue using their old telephone numbers even when they change the telecommunications carrier to which they subscribe and that numbers will no longer need to be changed each time the carrier is changed. It has the aim of improving user convenience and promoting competition between carriers, by essentially in Vietnam, studies on standardization of signaling method, processing of application and processing among carriers should be made among the carriers including study by standardization bodies.

5.4 Review of Existing Numbering Plan in Vietnam

5.4.1 Subscriber Numbering Capacity in Vietnam

Numbering capacity for Area Code and Subscriber Numbers in existing numbering plan in

Vietnam is reviewed.

(1) Numbering Capacity for Fixed Subscriber Number

The number of digits for the subscriber number should be decided by taking into account the number of districts and exchanges installed in the closed numbering area as well as the telephone demand. In Vietnam, 7 digits for Ha Noi and HCMC and 6 digits for other provinces are assigned for subscriber number.

This study result indicates that numbering capacity shortage is expected to occur in the province of Hai Phong, Hai Duong, Dong Nai and An Giang between 2010 and 2020, and many provinces in the future. The only way to increase the capacity is to add one additional digit (from 6 digits to 7 digits) on the top of subscriber number.

Because it is not realistic to divide the area (Province) into two.

(2) Numbering Capacity for Cellular Mobile Service

The number of cellular mobile subscriber at 2010 will be 1,600,000. In addition, new mobile system will be introduced and new carriers would enter into this market. Therefore a large scale of numbering system must be designed. At present the number of network service carriers is two, VMS and GPC, and the numbering capacity for the mobile telephone service is estimated according to the present numbering plan as shown in Table 5.4.1-1.

Table 5.4.1-1 Numbering Plan for Cellular Mobile Service

Numbering Plan	Carrier	Capacity
090-A B C D E F	VMS	$8 \times 10^5 = 800,000$
091-A B C D E F	GPC	$8 \times 10^5 = 800,000$
092-099	spare	

The present numbering plan cannot support mobile subscribers before 2010 considering the mobile demand estimated in Table 5.4.1-2.

Table 5.4.1-2 Demand Forecast of Cellular Mobile Service

Year	Demand Forecast	Required Digits(capacity)
1998	150,000	6 digits (800,000)
2010	1,600,000	7 digits (8,000,000)
2020	3,800,000	7 digits (8,000,000)

To accommodate the subscribers in 2010, 7 digits of cellular mobile numbers are required. In order to simplify the numbering style for both customers and carriers, it is recommendable to accommodate a carrier identification code (CIC) for identifying the network, considering the number of new carriers in the future. The candidate CIC is

"094X" and 7 digits of subscriber number is recommended.

5.4.2 Capacity of Numbering Areas

Numbering areas should preferably be decided to the full extent of the numbering capacity in accordance with a zoning system – such as by administrative district (Province, District) – which is familiar to users.

(1) Area Code

Each province has its exclusive area code with one, two or three digits. Three digits were applied when a province was administratively divided into two. Though the existing area code allocation is not in order, it is difficult to change the allocation now. Combination of one, two and three digits of area code is unavoidable / inevitable, considering the number of provinces in Vietnam and future 0AB(C) service such as cellular service, data service and new telephone services.

In Vietnam, code "0125X" is used for access to data network (VDC), which is not recommendable. Because many private companies want to enter this kind of business such as ISP and should have the equal access with VNPT (VDC).

71 out of 90 "0AB" codes are already assigned. There are 19 spare codes and some of them will be used for new services.

(2) Numbers for Various Services

To meet such diversified needs as cellular telephone, data service, paging service, absence-information service, facsimile communication service, etc., DGPT needs some principals of numbering system.

The "0AB(C)" system should be used for expansion services such as cellular telephones which are interconnected to telephone network. "0AB(C)" should also be used for service such as the free dialing service offered to every subscriber.

5.5 Recommendation

5.5.1 Numbering Administration

DGPT planned to open up telecommunication market to outside companies. Under these competitive environment, it is recommended that independent regulatory authority for numbering administration should be established somewhere in DGPT and smooth transition of numbering administration from the State-owned Carrier (VNPT) to the independent regulatory authority (DGPT) should be made.

5.5.2 Numbering Plan Under Competitive Environment

It is recommended to review the numbering plan in Vietnam under the competitive

environment. Guidelines of numbering plan for the following services are explained in this chapter; Fixed telephone service, Mobile communication service, Long distance and International service, and No.7 signaling numbering plan.

5.5.3 Numbering Plan in Vietnam

The following Numbering Plan in Vietnam was reviewed and recommended in this Chapter.

- (1) Capacity of Subscriber Number
- (2) Capacity of Area Code
- (3) Special Number
- (4) Numbers for various services

5.5.4 Number Portability

Number Portability has the aim of improving user convenience and promoting competition between carriers, by assuring user freedom in the choice of carriers. In order to introduce number portability at the earliest juncture, studies should be made involving the participation of the carriers.







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