CHAPTER 12

OPERATION AND MAINTENANCE PLAN

CHAPTER 12 OPERATION AND MAINTENANCE PLAN

12.1 Outline of Operation and Maintenance

12.1.1 Classification of Operation and Maintenance

(1) Operation and Maintenance for Customers

The main purpose of the maintenance and operation for the telecommunication network consists in how to maintain the various kinds of services in a good condition at the minimum cost. In this respect, the purpose for customer services can be classified into the following items:

(a) The services should be provided to the subscribers in an convenient way
(b) The services should be provided in a continuously satisfactory level
(c) The services should be provided in a uniform and flexible way
(d) The services should be at the minimum cost

(2) Operation and Maintenance for Operators

In the meantime, for the operating company the following items should be of first priority and of essential requisites from the viewpoints of operation and maintenance.

(a) A successful call of the telecommunications services is one of the key factors to keep an increase of revenue from the subscribers, because any telephone calls are charged at the time when the called party would answer and/or respond to the caller.
(b) Therefore, a call completion ratio to the number of an originating should be improved as much as possible in any communication ways.
(c) A fault ratio to the number of subscriber per month/year should be minimized.
(d) A telecommunication productivity (for example; the number of subscriber per employee of the operating company) should be increased as the number of subscriber will increase in the expansion programs.
(e) An operation and maintenance work should be carried out at the lowest cost.

Taking into accounts the above-mentioned conditions for both the customers and the operator, the current situations on the operation and maintenance in VNPT/ major operation companies of VTI, VTN, VDC, VMS and Provincial P&T have been reviewed and studied through the data analysis and the site surveys which are conducted by both JICA Team and the Counterpart Group.

12.1.2 Current Situations of Telecommunication Network and Facilities

The current situations of telecommunications network and facilities in Vietnam can be summarized as described in the followings:

(a) The telephone exchanges are digitized.

(b) For the transmission network, SDH-2.5 Gbps Transmission System is already introduced for the Backbone Transmission Route (Ha Noi -Da Nang - Ho Chi Minh).

(c) Upgrading of the transmission capacity and speed are under rapid progress.

(d) N-ISDN technology has been introduced as an experimental stage.

(e) No.7 Common Signaling System has been adapted for the Switching Hierarchy of International Switch, Toll/Tandem and Main Switch (LS) for Ha Noi, Ho Chi Minh and Da Nang, and other main switching stages.

(f) A Network Operation Management system is under development by VNPT, VTN and Provincial P&T.

(g) An access network operation and management system is also under rapid development, including the facility management for Outside Plant such as the outside plant management system, CAD system, etc.

12.2 Current Situations of Telecommunication Service Operator

12.2.1 Present Situation of Vietnam Telecommunications National (VTN)

(1) VTN is a State Member Company which is responsible for operation, administration and management of Vietnamese inter-province networks and for providing long-distance transmission network.

(2) VTN Operation and Maintenance Center (OMC)

All VTN networks are sectioned into three (3) operation and maintenance regions:

(a) Northern region is from the north to the boundary of Ha Tinh

(b) Central Region is from Ha Tinh to Nha Trang

(c) Southern Region is from Nha Trang to the South

Each region is controlled by the Regional OMC which is responsible for executing the operation, administration and management of works, as shown in

the followings:

- Northern Region ; Ha Noi Operation and Maintenance Center(OMC)
- Central Region ; Da Nang OMC
- Southern Region ; Ho Chi Minh OMC

(3) VTN Transmission Network

As a backbone route, optical fiber transmission system SDH-622Mbps/2.5Gbps was constructed. This system is connected through a backbone station of each Province to which an intra-province transmission network is interconnected. The intra-province transmission network consists of SDH-622Mbps system/SDH-155Mbps and the 140Mbps radio system (Ha Noi-Ho Chi Minh).

Backbone route is composed of 4 ring-networks which cover the transmission route of the national road alongside the coastal line of Vietnam and the high voltage electric line along the mountain areas of borderland of to neighboring countries.

In addition, the Optical Fiber Transmission route of SDH-622Mbps covers the Route Ha Noi-Hai Phong-Quang Ninh and the Route Ho Chi Minh-Vung Tau.

(4) VTN Switching Network

VTN is performing an operation, administration and management works of Transit switching system equipped in Ha Noi, Da Nang and Ho Chi Minh.

The switching types of manufactures are as follows:

- Ha Noi : Ericsson exchange + LG exchange
- Da Nang : Ericsson
- Ho Chi Minh : Ericsson exchange + LG exchange

In addition, Local switching system (LS) functioned as a lower hierarchical switching stage in the network is installed in each Province (61 provinces) to be interconnected to the above-mentioned higher ranked Transit Switch. The operation and maintenance these LS exchanges are supervised and controlled by the integrated Operation & Maintenance Center (OMC) of Province.

12.2.2 Outside Plant (OSP) Maintenance Activities of P & T

(1) Summary

OSP maintenance activities cover ;

- daily fault repairing works,
- restoration works of the damaged cables,

- scheduled upgrading works

In general, each regional P&T or telephone company in a city looks after the OSP facilities in the area, in which the maintenance works are so cooperated each other among the neighboring P&Ts that requesting and occasionally offering the reinforcement of the workers in line with the scale or volume of the troubles.

(2) Situation of Fault Occurrence

The information/data referred in this section is based on the fault records observed during certain periods last year in Ha Noi area and the interviews at regional P&T through the field surveys.

According to the analysis of the fault data in Ha Noi area, 33% of the total numbers of the customer complaints regarding the telephone service is counted the faults in the OSP portion (subscriber network and drop wires) and 18% of it is in telephone sets, and the 31% and 18% are categorized as TOK (Test OK : identified no malfunction) and others, respectively. (see Figure 12.2.2-1)

Situation of fault occurrence breakdown for the customer complaints in Hanoi area is illustrated in Figure 12.2.2-1 "Analysis of Customer Complaints"

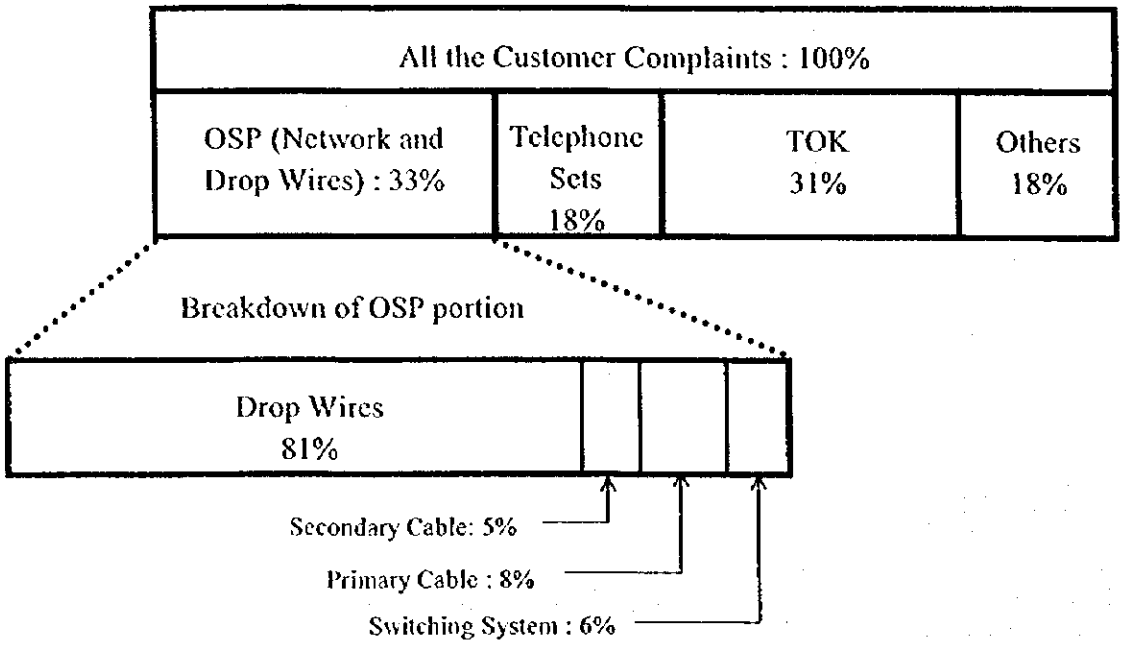


Figure 12.2.2-1 Analysis of Customer Complaints

The Fault Ratio on network portion in Hanoi is calculated roughly as follow ;

The category of "OSP" consists of the switching system, primary cables,

secondary cables and drop wires. The category of "others" includes the complaints due to the customer's miss-operations, e.g. handset off.

As shown in the figure, the percentage of faults caused in the drop wires, 81%, is remarkable. This figure suggests obviously the action to be taken at first toward decreasing the fault occurrence.

The existing Fault Ratio on subscriber network portion in Ha Noi is calculated roughly as follow ;

4% (monthly 4 faults per 100 subscribers).

In Da Nang area, it is mentioned as ;

20% (monthly 20 faults per 100 subscribers).

The target criteria of the fault ratio have not been authorized in VNPT yet.

On the other hand, the target of the maximum time to repair is established, but not strictly, in each P&T as ;

To repair within 4 hours for Intra-Province while 2 hours for the local area. Actually 90% of the faults is repaired within 4 hours after dispatching and the rest 10% is completed at least within 2 days. The delayed cases due to the customers' absence are not included in this percentage.

(3) Work Flow of Fault Clearance

The workflow of fault clearance is described as follows ;

The customer's complaints on the telephone service are delivered through the "dial 119" and received at the Customer Service Center located in P&T.

(a) The telephone line condition is tested immediately from the line-testing unit in the center.

(b) If the line is good condition, the test result is informed to the customer.

(c) If not so, the fault information is forwarded and registered to/in the server equipped in the Maintenance Center (Telecom Center) through MODEM line.

(d) The Telephone Center calls the repairing group stood by in the charged area and the repairman is dispatched.

(e) The repairman reports the work status to the center every half-hour.

(f) After confirmation of the repair by testing from the Host Exchange, the records are registered.

This process is illustrated in the Figure 12.2.2-2.

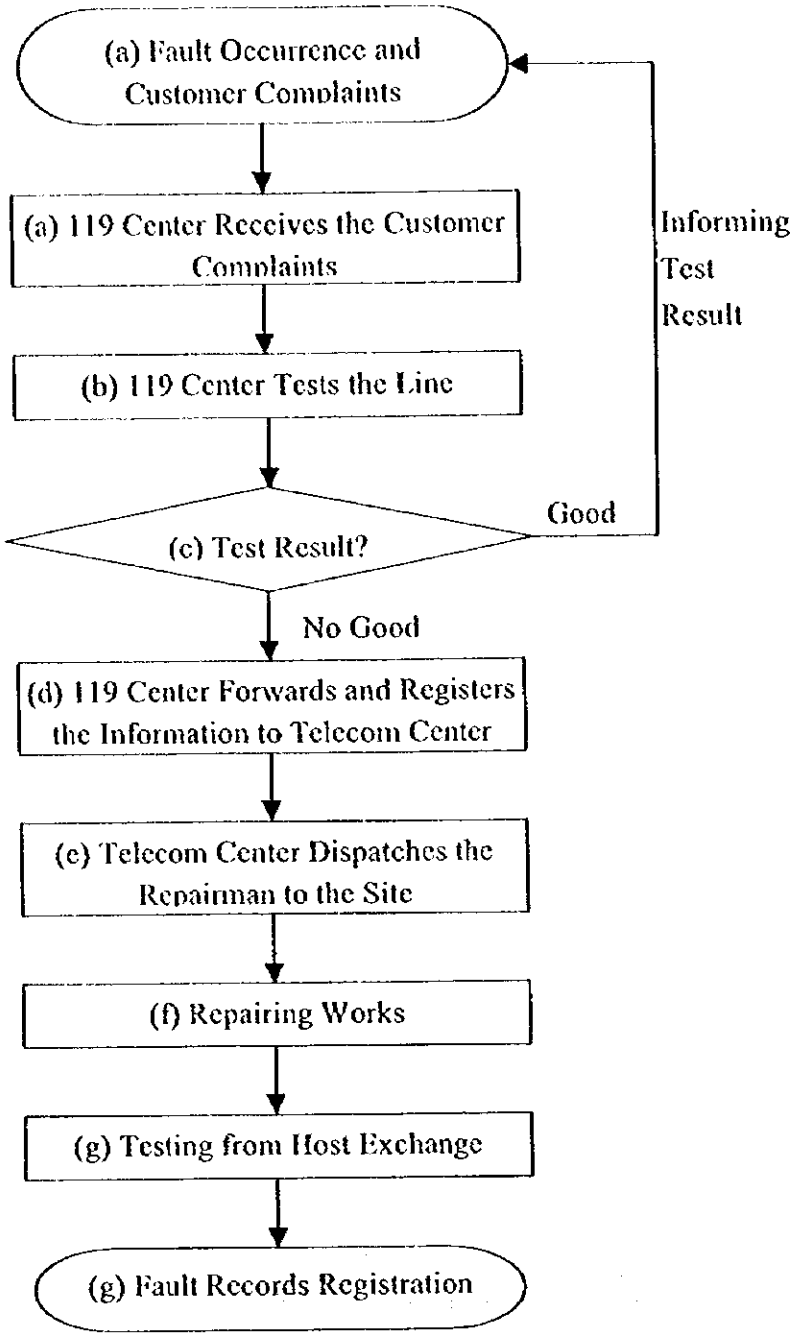


Figure 12.2.2-2 Work Flow of Fault Repairing

In Ha Noi area, the OSP maintenance groups consist of the fault repairing works, OSP up-grading works and PABX/Fax maintenance works. These groups are deployed as follows;

- 6 groups for the fault repairing works in 3 Host Exchange areas,
- 2 groups for up-grading works, and

- 1 group for PABX and Fax maintenance works.

Each group has 14 to 25 members.

The maintenance group is named DMC, and one DMC for faults repairing looks after 2 local areas on average.

As for the OSP maintenance activities, one of the ODMC staff looks after approximately 460 subscriber lines, in Ha Noi.

(4) Fault Repairman

The repairman, usually dispatched in pairs and/or more persons, move to the subscriber site by his motor bike or bicycle after receiving the repairing order.

During repairing, he informs the status every half-hour from the site to the Center and receives next order.

In case of unfinished repairing within 4 hours, the reason is to be reported.

(5) Upgrading Activities

In order to enhance the cable network quality, the following facilities are being renewed according to the regional P&T yearly plan ;

- Replacing the old-type metallic DP with of the robust reinforced plastic made
- Relocating the aerial cables to underground
- Replacing the existing drop wires with new ones

In Ha Noi area, these activities are carried out by a DMC (16 staff), recently reinforced with one more. The group engages not only the above upgrading works but also the scheduled cable repairing works.

The construction vehicles, a truck and a crane, are disposed.

The following necessary construction outfits are lent to the staff ;

- Lineman Tester
- Electricity Checker
- Safety Belt
- Helmet and Safety Jacket
- The other tools.

(6) Phased Service Target

The phased service targets on OSP maintenance are essential in the activities.

(a) Fault Rate

The phased target of the fault rate to be dropped shall be authorized

countrywide.

(b) Time to Repair

The target of maximum time to repair (fault clearance time) shall be defined considering the phase and regional condition.

(c) Repetition of Fault

Preferably, the target of repetition of fault may be defined in order to enhance the customer satisfaction, i.e. to prevent the fault occurrence.

12.2.3 Transmission Network Management System

Three (3) Network maintenance centers have been installed throughout the country. As mentioned above, the whole Operation and Maintenance networks are divided to subsections of the 3 transmission O/M regions at Ha Tinh and Nha Trang in relation to the geographical conditions. Regarding these O&M Centers, VTN O&M centers (OMC) are situated in three main large cities, Ha Noi, Da Nang and Ho Chi Minh respectively.

Additionally, P&T maintenance center is situated in each province, totaling 61 OMCs.

(1) Network Management System.

Network management system is classified into two (2) systems: an individual control system that correspond to individual equipment, and an integrated control system that controls the equipment for an entire network. The integrated control system provides centralized control functions at the upper level of individual control systems which directly control the equipment for the entire network through the Network Management system(NMS). This system is a so-called "TMS" recommended by ITU-T, although the integrated control system is not realized yet in Vietnam.

(2) Current Transmission Management System.

The SDH Network provides centralized control functions which are fault management, performance management, configuration and security management. A large amount of different reports are available in the system and these reports can be directed to the printer or to the screen.

These statistical data is reported and analyzed at VTN Maintenance section and finally submitted to VNPT administration bureau of " Telecom Division".

The outline of network management system is shown in Figure 12.2.3-1.

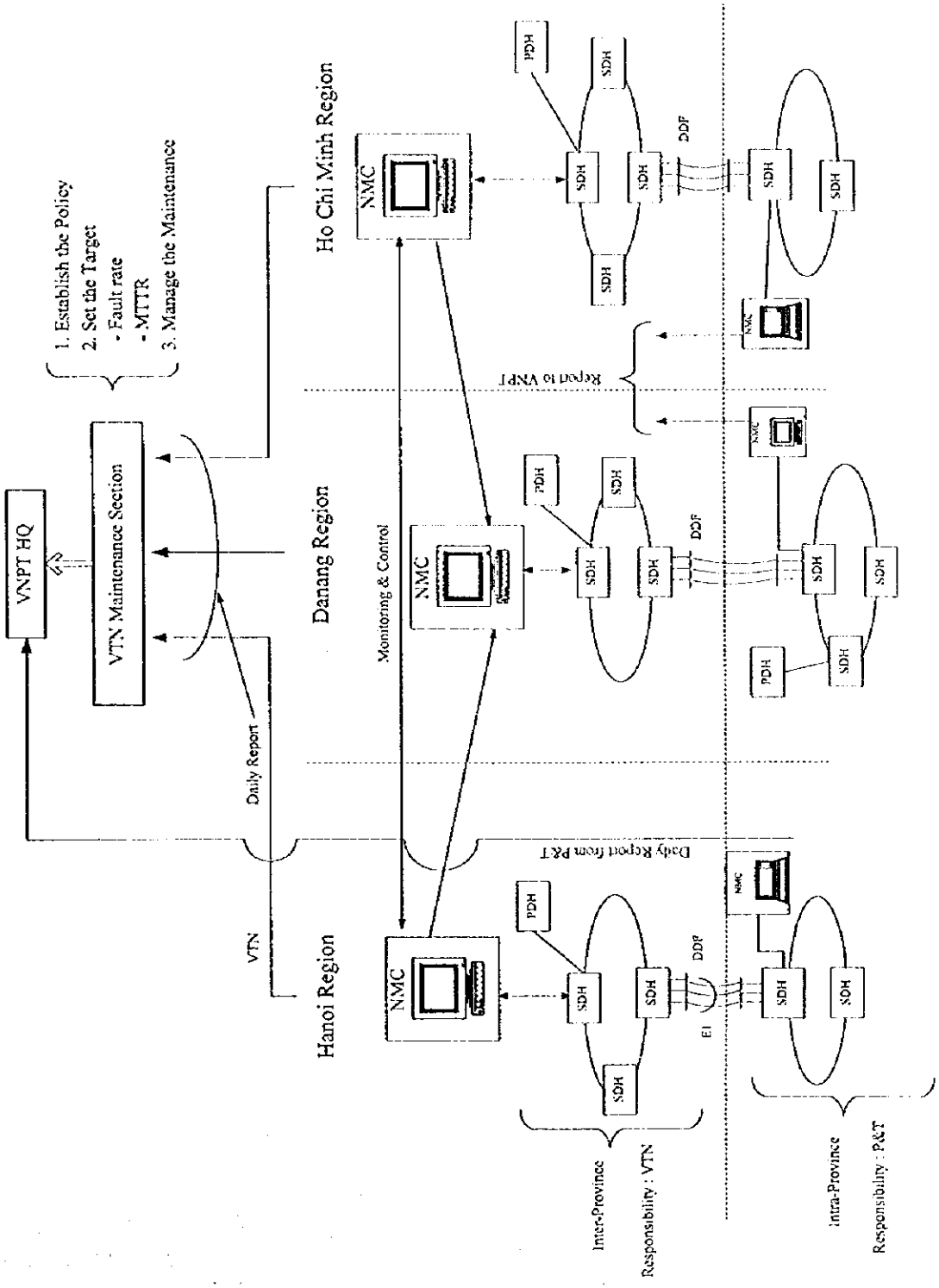


Figure 12.2.3-1 Outline of Network Management

(a) Deployment of Operation & Maintenance Center

VTN has two (2) organization of O&M Center; (i) Equipment and (ii) OF cable O&M Center.

The hardware failure is managed by three O&M Centers, Ha Noi, Da Nang and Ho Chi Minh. The cable failure is covered by six (6) O&M Centers, Ha Noi, Vinh, Da Nang, Qui Nhon, Nha Trang and Ho Chi Minh respectively.

P&Ts manage the own provinces by themselves. The current deployment and management of O&M Center is shown in Figure 12.2.3 -2 and the coverage area of both O&M Centers are shown in Figure 12.2.3-3 and Figure 12.2.3-4.

(b) Operation condition of Backbone Network

The total length of OF (Optical Fiber) cable on road No.1 is buried under ground during the construction period, however 10 to 20 OF cable failures occur per year due to road construction activity. Ministry of Transport causes this activity and accident will be reduced in year-1999 from their construction schedule.

However traffic is not interrupted due to ring protection. SDH equipment is in good condition and very stable.

In Backbone SDH Network installed power line, the network is maintained under following condition.

- The OF cable is laying on top of 500KV power line from Hoa Binh to Ho Chi Minh.
- No maintenance staff resides at the repeater station.
- Three (3) power systems are equipped, commercial power, Battery (Solar), Engine (automatic). The fuel capacity of Engine covers 2 weeks.
- All SDH equipment is installed in Building, the shelter is not used.
- The condition of SDH equipment is very stable.

The inter-provincial radio system is occasionally remove and replaced by OFC transmission system due to high traffic demand.

Certain P&T reports on Intra-province condition, 5 to 7 failures of small capacity radio system occurs per one month due to old type of microwave radio equipment and thunder damages. However, OFC Transmission System causes no problem so far.

(c) The Backbone capacity

The maximum capacity of Backbone Loop (STM-16 2F-BSHR) is 504E1, however according to VTN information, the network capacity will be 100%

occupied by the end of 1998.

In 1999, upgrading of the current system may be an essential work for VTN.

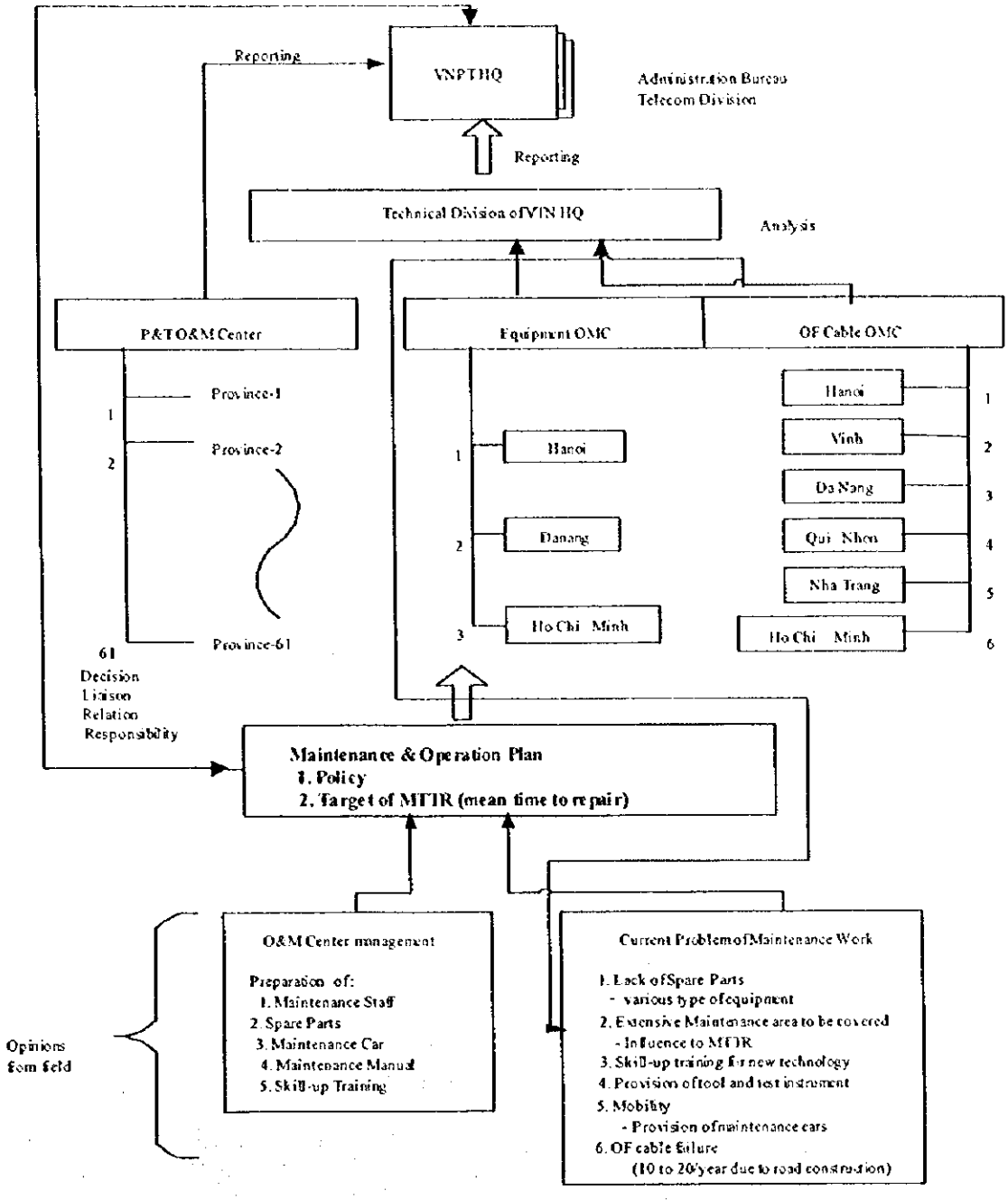


Figure 12.2.3-2 Deployment of Operation and Maintenance Center

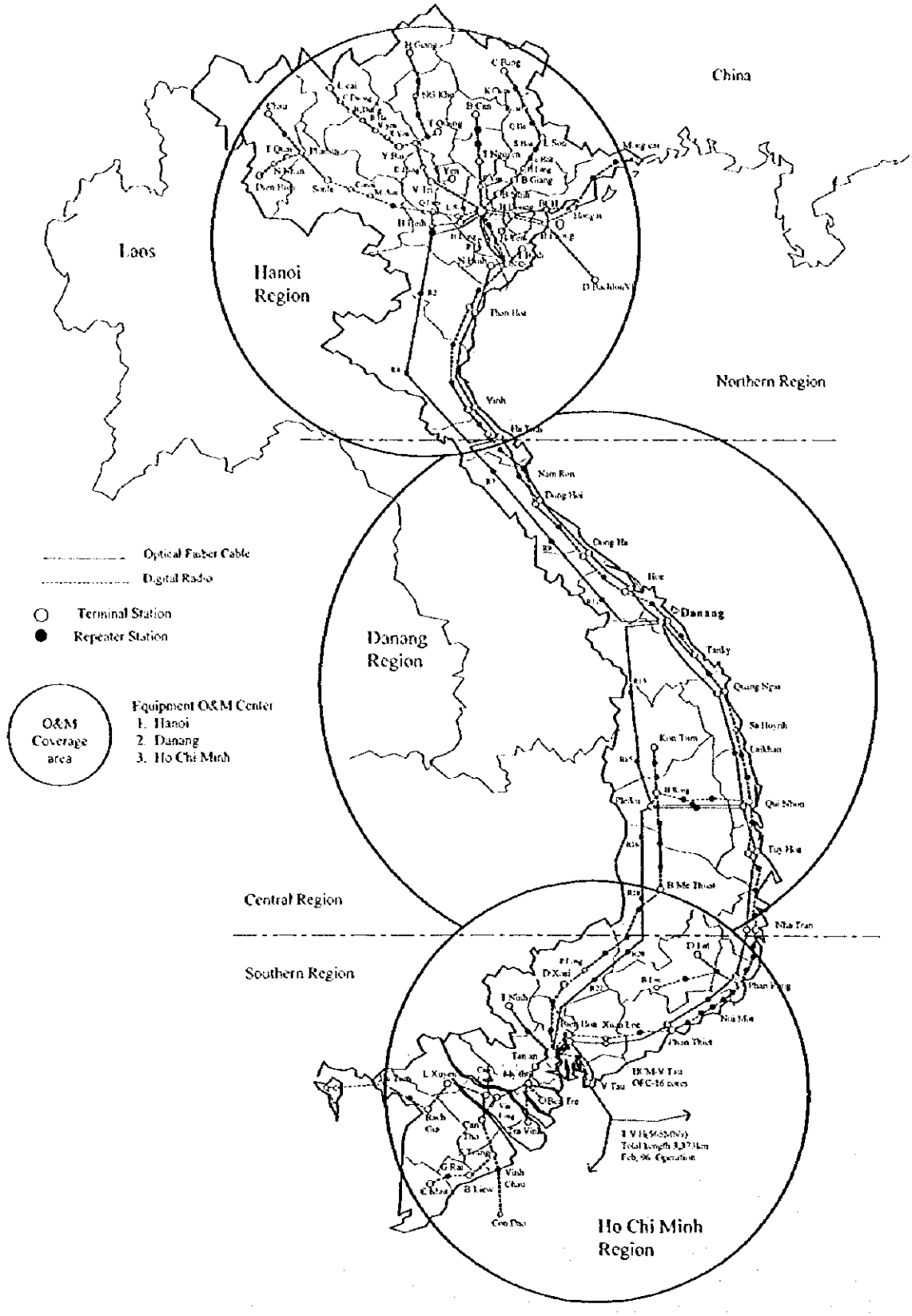


Figure 12.2.3-3 Coverage Area of Equipment O&M Center

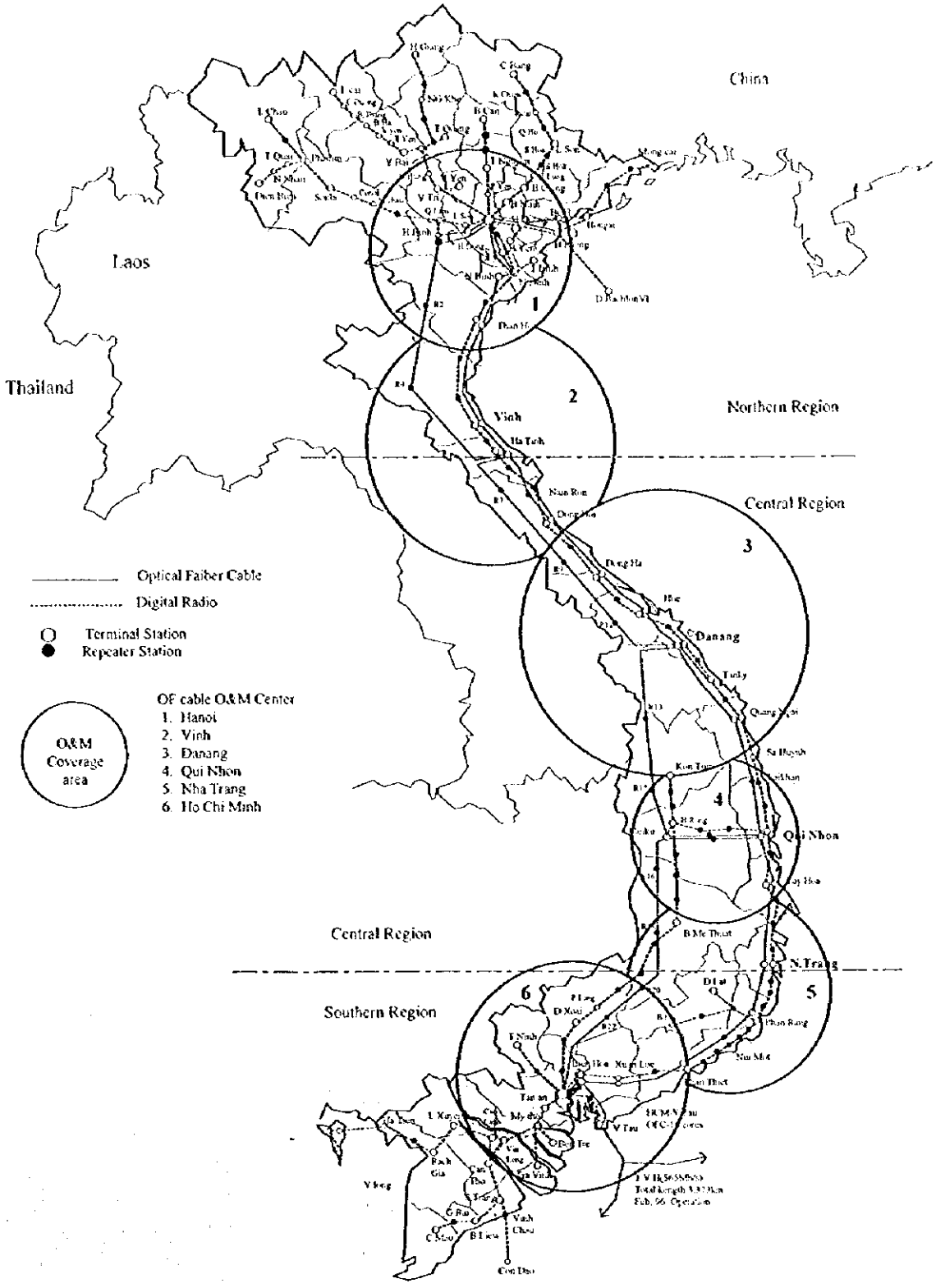


Figure 12.2.3-4 Coverage Area of OF Cable O&M Center

12.3 Customer Services System

(1) Summary

VNPT and Provincial P&T have already introduced a lot of personal computers and some Local Area Network (LAN) systems for Customer Services business operation and maintenance. Although these systems are developed by VNPT and Province P&T, it has been said it will be necessary to improve the present systems to satisfy the customer's needs and requirements. Especially, in 3 mayor cities of Ha Noi, Ho Chi Minh and Da Nang, an earlier introduction of CSS will be desired. As the results of the current surveys, there are items to be improved for account management (AM) system and facilities management (FM) system for the customer services that are required for its fast development.

(2) Purpose of Customer Service System Development

Based on the results of recent survey and findings, the main purpose of introducing Customer Service System may be summarized as follows:

(a) To improve the efficiency of Customer Service System operation and management in line with the growth of telecommunications service for customers

(b) To improve the operation and management on customer services and to enhance the quality of telecommunications service through the following actions: .

- Account analysis (Revenue/Expenditure)
- Multi-purpose utilization of customer database

(3) Necessary Functions for Customer Service System Improvement

The system integrates all customer information records, local network facilities and billing information by a common relational database administration system that supports necessary business work from a customer order to a production of invoice and collection of payment in the customer service center through the modification, allocation and installation of local network facility.

Major functions of the system are described in Table 12.3.1-1.

Table 12.3.1-1 Major Functions of Customer Service System under Planning

No.	Major Functions	Breakdowns
①	Customer Information Management	-Create customer master records based on application form -Update customer information -Report on market analysis
②	Service Order Handling	-Receive details on customer requests -Assign telephone number and cable/line numbers -Issue work order Order process control
③	Billing Procedure	-Service class and call data are input to exchange -Charging data are loaded to the system -To issue the bill as scheduled or as requested
④	Account Management	-Payment information is updated -Account management for payment check -Report on bill payment and outstanding balances
⑤	Dispute and Credit Control	-Complaint and dispute control and reporting works -Service suspension for no-payment subscribers -Normalize service upon payment acknowledgement
⑥	Facility Management	-To allocate OSP connection by subscriber address -Facility control for switching system
⑦	Work Force Management	-Arrangement of equipment installation -Management on manning schedule for work
⑧	Fault Repair Management	-Complaint registration and reporting of complaint analysis -To issue a repair work order -To manage fault records and reporting on faults analysis

12.4 Billing System

As the result of findings for the current study, the billing system of VNPT and Provincial P&T can be summarized as follows:

12.4.1 Present Situation of Charging Procedures

(1) Categories of Subscribers

According to the results of site study during this period (from August to October 1998) and the information given by DGPT, there are three (3) types of subscriber;

(a) Government subscriber

(b) Business subscriber

(c) Ordinary subscriber

Therefore, there is no distinct classification between business and residential telephone subscribers as prevailed at large in the countries of the world.

(2) Charging

As the results of the findings through site study and data analysis, charging is generally made in the following ways.

(a) Charging information such as the calling time, duration and the destination data are stored in the digital switching system together with necessary information.

(b) These stored data are forwarded to Provincial P&T Billing Center for further transactions

(c) At the billing Center, bills are calculated in accordance with the charging data of the subscriber number, the number of calls and traffic stipulated in tariff system.

(d) International charges are calculated in VTI and the charging data are periodically transferred to the Provincial P&T for review.

12.4.2 Billing Procedures

(1) Billing Center

Throughout the country, there are basically 61 Provincial Billing Centers, including Ha Noi (Capital) City, Ho Chi Minh City, Hai Phong City and Da Nang City.

Monthly billing is done at Provincial P&T. However, in some provinces the bills are issued at a district level exchange office from which the bills are sent directly to the subscribers.

(2) Billing Data

All necessary bill data for international calls are provided from related VTI, while the Operators assisted calls are handled in a manual way.

(3) Long distance call and international calls are noted in due items for the detailed billing on the request of customers.

(4) Local calls are not charged up to certain limit (fixed price: first 150 calls or 450 minutes for an office over 500 lines)

12.5 Network Management and Control System Plan

12.5.1 Network Management System

For the telecommunications network management in Vietnam, a network management is a day-to-day and/or a short term activity. The fundamental function of network management is to conduct a supervisory and control process of the telecommunications systems on a real time basis of " near real time basis" for the telecommunications network.

The activity and control process consist of mainly two (2) works of which organization responsibilities are also described in the followings:

(1) Operation and Maintenance Activities

Operation and maintenance activities can be classified as described as follws;

(a) Network fault clearance

This activity means an operation and intervention to the inside plants, such as switching system, transmission system, radio system, power systems, etc. and the responsibility of the activity can be taken by VTN Operation and Maintenance Center (OMC) and 61 Province OMC, including four major city OMC-Ha Noi P&T OMC, Ho Chi Minh City OMC, Da Nang OMC and Hai Phong OMC, as described in above-mentioned Sections 12.2.1 and 12.2.3.

(b) Subscriber fault clearance

This activity is normally undertaken in conjunction with the customer service system (it may be referred to as CSS) of which main jobs are attributed to the outside plant system; in case of Ha Noi area 33% of the total numbers of the customer complaints come from Outside Plant portion. The responsibility of this work is under OMC of P&T.

(c) Multi-alarm supervision of the systems, peripheral equipment and the associated connection systems can be included in this activity regarding the switching and transmission.

(d) Traffic control, if necessary

(e) Traffic rerouting, if necessary

(f) Corrective operation and maintenance activity which is normally carried out during a regular working hours is often motivated by remote distant man-machine interface commands or by directing site staff of OMC of VTN and 61 Provincial OMC

(g) Billing data process through the collection of charging data.

(h) Statistic data collection for service quality control and follow-up management process for the sustaining indictors and guidelines of Maintenance and Management.

(i) Routine activity has to be clearly designated under the control of VNPT, VTN and P&T for the regular works such as programs, job contents and budget control as well as a countermeasure against a large scale fault and/or grave trouble so that an actual action could be immediately taken against unexpected cases.

(2) Subscriber line installation

Data are provided to the customer service system after the subscriber line will be "put into service". Initial input data are classified into ① initial charging counter values; ② description of telephone set type; and ③ description of installation, etc.

12.5.2 Present Organization of Network Management

The present organization is basically described and illustrated in the preceding section and paragraph of 12.2.1 through 12.2.3 together with figures of 12.2.3-1 and 12.2.3-2.
The present situation of the network management and control system in VNPT must be reviewed and thoroughly studied for the purpose of appropriate proposition and recommendation towards 2010 on this subject.

(1) Switching Network Management

The switching network management can be divided into three (3) hierarchical groups from the Head Office to site office and vice versus.

(a) International Switching Group: VNPT ↔ VTI ↔VTI 3 ITC(Ha Noi, Da Nang, Ho Chi Minh)

(b) National Transit Switching Group: VNPT ↔ VTN ↔3 Regional Transit Center (Ha Noi, Da Nang, Ho Chi Minh)

(c) National Switching Network Group: VNPT ↔ 61 provincial P&Ts

(2) Transmission Network Management

For the transmission network management, there are also three (3) hierarchical groups in relation to network facility and their system.

(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 Trang) for Optic Fiber Cable OMC

(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 <-> Intra-province transmission

(3) Subscriber Network Management

For the subscriber network management can be described as "Access Network" in an 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 the operation and maintenance work especially for the Outside Plant system.

For example, in Ha Noi area, the Outside Plant OMC group consists of the fault repair works, Outside Plant up-grading works and subscriber equipment (PBX/FAAX) works

In Ha Noi, there are 6 fault repair groups for 3 MSU Exchange Offices, 2 groups of up-grading works and one (1) group for subscriber terminal equipment maintenance work.

(4) Integrated Network Management Organization

In order to improve the present operation and maintenance services quality, OMC organizations must have a uniform and effective structure for mobilization and service quality, as described in Figure 12.5.2-1.

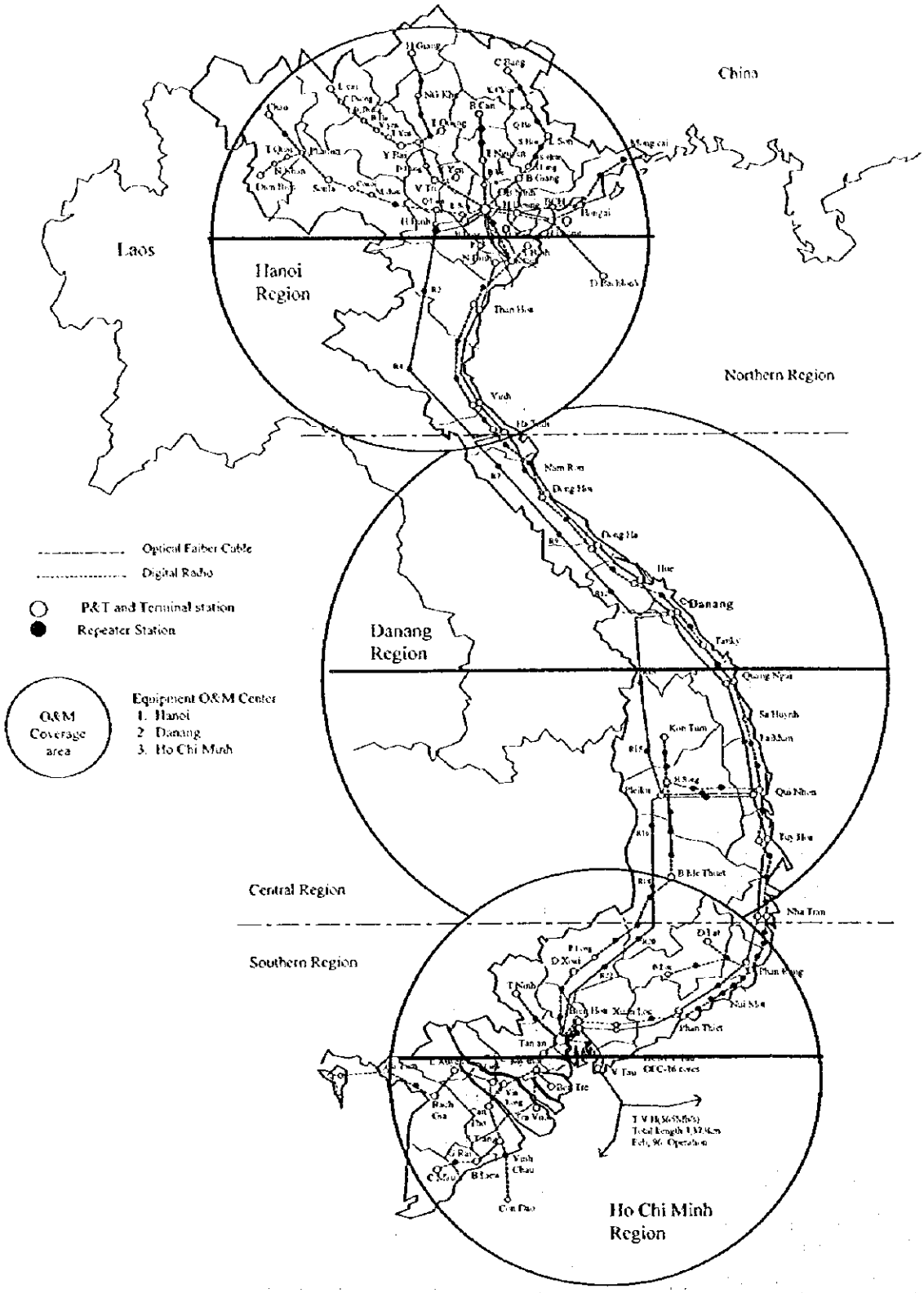


Figure 12.5.2-1 Coverage Area of Management O&M Center

12.6 Network Management System Approach

Based upon the results of findings and reviews obtained from the field study and the data analysis, the following items can be pointed out in order to conduct a succeeding study for further clarifications on each item.

(1) Network Management System

As described above in the related Section, Paragraphs and Items in this Chapter, the telecommunications facilities and networks have been modernized to cope with the development and innovation of the socio-economy in Vietnam:

(a) Digitalization of Switching Systems

The switching systems of composing the telephone networks are already of a fully digital brand which are equipped with even advanced functions:

- No. 7 Common Channel Signaling , ISDN
- Interconnection and for new technology (V5 interface, Frame Relay)

In addition to this, these digital exchanges have been already introduced in the network hierarchy of International switching, National Toll / Tandem, Main Switch and even to the District areas.

On the other hand, VNPT operation and maintenance for the exchange network is done on a regional basis, not a centralized basis.

Consequently, supervision and control on a fault occurrence have to be limited to the regional scale at maximum. This means a nationwide network operation and management must be provided on a nation scale.

(b) SDH Transmission

The backbone transmission route of linking a trunk line between Ha Noi and Ho Chi Minh is equipped with a high speed and large capacity system of SDH.

This route has provided a higher reliability for the network, because a ring network has been composed by inter-linking two (2) trunk transmission routes of the optical fiber transmission route on the coastal line of Vietnam and SDH Transmission system on 500kv electric transmission route as well.

For these reasons, as an integrated network management system on a nation wide scale, it is desirable to introduce a Telecommunication Management Network (TMN) in accordance with ITU-T Recommendation of M.3010, M.3020, and M.3100

(2) Fault Control and Management

The majority of the fault occurrence of the network comes from outside plant facilities including the subscriber premises equipment, as described in the above-mentioned Section 12.2.2. For example, fault cases are found out that the OSP facilities are cut down due to the traffic accidents, the telephone instrument itself falls into trouble, etc.

As for the switching system trouble, some irregularity on input telephone data and equipment faults are quoted as a cause of trouble. Faults on transmission systems including radio systems have occurred due to the natural calamity, power system failure and the like.

Under these circumstances, it is desirable to set up an operation, maintenance and management center for the access network in order to cope with fault handling and improvement of customer services.

12.7 Improvement of Telecommunication Services Quality

(1) Study Items

During the current study period, the study and review have been made on present situation of services quality from not only the standpoints of operator's management but also the subscriber's satisfaction. Up to now, some data have been available for the following key items:

(a) Faults ratio: faults per month/year per 100 subscriber lines

(b) Call completion rate (Successful Call Rate)
- Local Call (Intra-Province)
- Long Distance Call (Inter-Province)
- International Call

(c) Fault Clearance Rate (Hours)

The study results show that a considerable improvement has been made on item (b) call completion rate (CCR/SCR) among these three (3) service quality criteria. Because in some provinces in the Central Region of Vietnam, CCR/SCR reaches 75-80% for local call, 70-75% for long distance calls and about 70% for international calls.

As for item (a) Faults rate per year per 100 subscriber line, although available data have not been obtained so far, a worldwide data can be shown in the following as a reference for Vietnam:

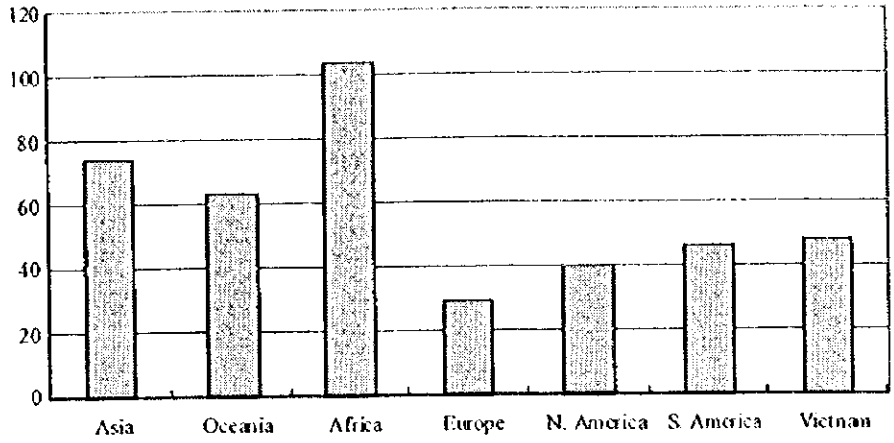


Figure 12.7-1 Faults per 100 Lines a Year

(2) Performance Target of Telecommunication Service Quality

For the purpose of providing reliable telecommunications services with customers and sustaining the better quality of services at all times, operators have to set for a performance target of service quality to the satisfaction of customers as well as improvement of financial status of the carrier.

Essential factors of performance targets are as follows:

(a) Operation and Maintenance

(i) Items related to faults

- Fault rate
- Fault clearance ratio
- Reception of fault

(ii) Items related to traffic

- Call completion ratio

(b) Marketing

(i) Items related to Service Order (SO)

(ii) Items related to Complaint

In this respect, the reference data among Asian countries have been collected to make comparisons between Vietnam and other foreign operators in Asian countries.

Table 12.7-1 Comparisons of Performance Target of Service Quality

Performance Target Of Service Quality	NTT	Operator in Thailand	Operator in Indonesia	Operator in Vietnam
1. Fault				
1.1 Fault Rate	· Subscriber 1 fault /month (per 100 sub.) · Network 0.5 fault/month (per 100 sub.)	· 0.5 fault/month (per 100 sub.)	Average number of monthly faults must be improved to keep the value under the following targets: · current status 1 .55faults /month (per 100 sub.) · to year 2001 0.5 fault/month (per 100 sub.)	
1.2 Fault Clearance Time	In principle, faults be cleared on the same day	Within one(1)day : more than 95%	① Fault Clearance Ratio by next day: · present: 60% · year 2001:95% ②Fault Clearance Ratio by next day: · present: 60% · year 2001:95% ③The longest days necessary full recovery: · present: 30 days · year 2001: 3 days	
2. Traffic Control				
2.1 Call completion Ratio	Local: more than 75% Long distance: More than 70%	Present time: 55%	Local: · present: 60% · year 2001:95% Toll transit: · present: 60% · year 2001:95%	
3. Marketing				
3.1 Days for service commencement	· Each branch office sets up the targets. · Almost all requests of clients are sastified.	· within 30days after receipt the payment from subscribers	6 levels for 1 day- 3 moths. · Urban:to2001,7 days 100% · Suburban: to 2001 7 days 100% · Leased line: to 2001, 7 days 100%	

(3) Spare Part Storing and Tools

In the operation and maintenance works for telecommunications facilities, how to clear the identified faults as soon as possible is the most important to sustain the service availability at all times. In this respect, a faulty board or package

mounted on the switching system, transmission / radio systems and access network system (DLC, WLL, subscriber terminal equipment, etc.) are usually replaced by a new board or package for recovering the faults.

Therefore, to keep the service quality within an allowable target of time and rate would depend on how spare parts can be available when and where they are needed.

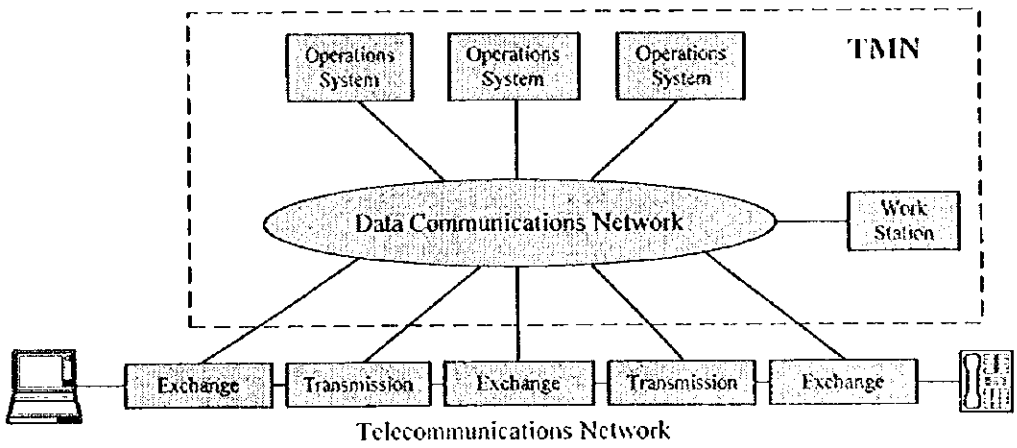
However, if the quantity of spare parts storing increases so much the operation and maintenance exceeds the budget resulting in reducing the productivity.

As a conclusion, spare part storing should be optimized so as to balance the service quality sustainability and the operation and maintenance costs. For this purpose, spare part storing system must be standardized.

12.8 Development of Telecommunication Management Network

12.8.1 General Description of TMN

For the purpose of basic understanding, a TMN can be imagined as a very large Operation System (OS) (See Fig. 12.8.1-1). It has access to all telecommunications equipment in a network. Automatic monitoring and controlling of the telecommunications equipment via these accesses is based on indications and notifications received from the equipment. Triggering of actions by human intervention via the Work Stations.



Note : The TMN boundary may extend to and manage customer/user services and equipment

Figure 12.8.1-1 General Relationship of TMN to a Telecommunication Network

Main objectives of a TMN are to provide based on OSI (Open System Interconnections) Systems Management technology:

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
4) Provide its services in multi-vendor environments(for example, VNPT,VIETEL, SPT, VMS, VTI, VTN etc.)

TMN defines standard information models, interfaces, and functions for computerized network management. For example, the Qx interface has been defined for communication between management computers and SDH transmission terminal equipment, and the Q3 interface has been defined for communication between management computers. TMN inherits the management procedures and functions of the Open Systems Interconnection (OSI), which was also standardized by the ITU-T. It allows information to be handled by means of abstract concepts called managed objects, which do not depend on the details of specific devices. Therefore it facilitates centralized management of many kinds of equipment from different manufactures.

Figure 12.8.1-2 shows a physical architecture for TMN.

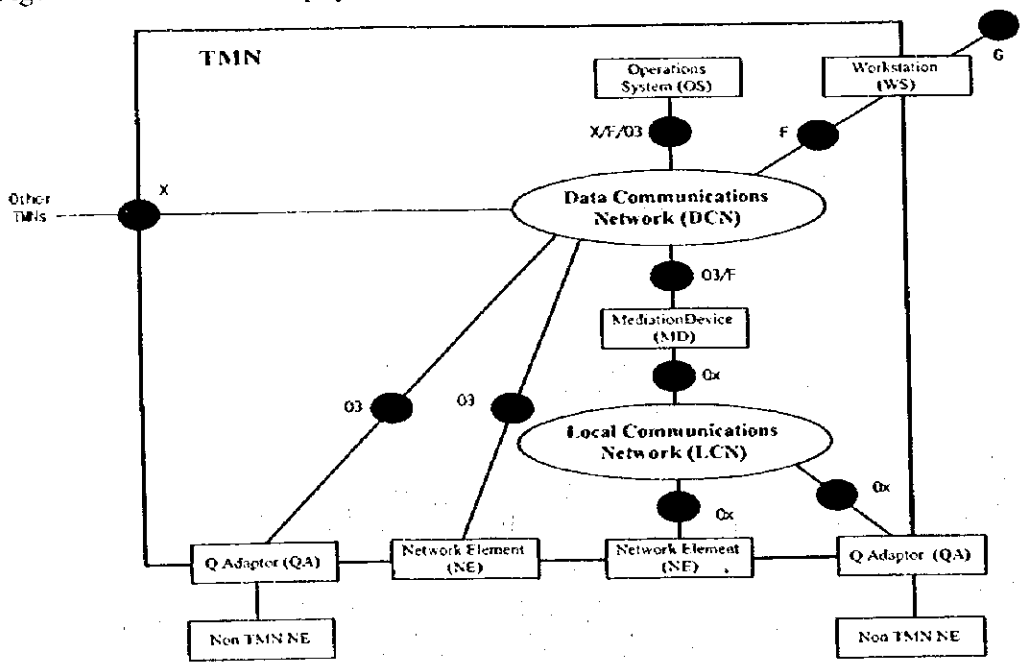


Figure 12.8.1-2 Physical Architecture for TMN

The Network Elements (NE) is comprised of telecommunication equipment (or groups/parts of telecommunication equipment). The NE communicates with the TMN for the purpose of being monitored and/or controlled.

The Q Adapters (QA) is a device that connects NEs or OSs with non-TMN compatible interterfaces to Qx or Q3.

Operation Systems (OSs) is the system which processes information related to telecommunications management for the purpose of monitoring/coordinating and/or controlling telecommunication functions

The Data Communications Network (DCN) is a communication network within a TMN. The DCN will be used by the TMN component for exchanging information.

The Mediation Devices (MD) is the device that acts on information processing between OS and NE to ensure that the information conforms to the expectations of components attached to the MD.

The Work Stations (WS) is the system which translate TMN information to a displayable format for the management information user. The WS includes support for interacting at a human user.

12.8.2 Relationship of TMN to Telecommunications Network

A TMN can vary in complexity from a very simple connection between an OS and a single piece of telecommunications equipment to a complex network interconnecting may different types of OSs and telecommunications equipment.

A TMN may provide management functions and offer communication both between OSs themselves, and between the OSs and the various parts of the telecommunications network. A telecommunications network consists of many types of analogue and digital telecommunications equipment and associated support equipment, such as transmission systems, switching systems, multiplexers, signaling terminals, front-end processors, mainframes, cluster controllers, file servers, etc. When managed, such equipment is generically referred to as network elements (NEs).

As shown in Figure 12.8.2-1 in the general relationship between TMN and the

telecommunications network that it manages, TMN is conceptually a separate network that interfaces a telecommunications network at several different points to send/receive information to/from it and to control its operations. A TMN may use parts of the telecommunications network to provide its communications. Thus, there will be a requirement for the management by the TMN network.

12.8.3 Functions associated with TMN

TMN is intended to support a wide variety of management areas which cover the planning, installation, operations, administration, maintenance and provisioning of telecommunications networks and services.
The specification and development of the required range and functionality of applications to support the above management areas is a local matter. Five management functional areas (FCAPS) identified to date are as follows:

(1) Fault management

Fault (or Maintenance) management is a set of functions, which enables the detection, isolation and correction of abnormal operation of the telecommunication network and its environment.

Alarm surveillance, Fault localization, Testing

(2) Configuration management

Configuration management provides functions to exercise control over, identify, collect data from and provide data to NEs.

Inventory, Backup and restoration

(3) Accounting management

Accounting management provides a set of functions, which enables the use of the network service to be measured and the costs for such use to be determined. It provides facilities to

- collect accounting records
- set billing parameters for the usage of services

(4) Performance management

Performance management provides functions to evaluate and report upon the behavior of telecommunication equipment and the effectiveness of the network or network element. Its role is to gather statistical data for the purpose of monitoring and correcting the behavior and effectiveness of the network, NE or

equipment and to aid in planning and analysis.

Monitoring performance data, Data Filtering, Trend analysis

(5) Security management

The functions contained within Security management may differ from administration to administration. Security management will include:

- Horizontal Access Security, Vertical Access Security, Audit Trails, Security Alarms, Test Audit Trail Mechanism, Report Audit Actions, Management of Audit trails, Intrusion recovery, Request Credentials Information, Send Credentials Information, Report Authentication Results
- Provide secure access to NE, OS and sub-network controllers

Figure 12.8.3-1 shows one of the examples of the Function of Network Management

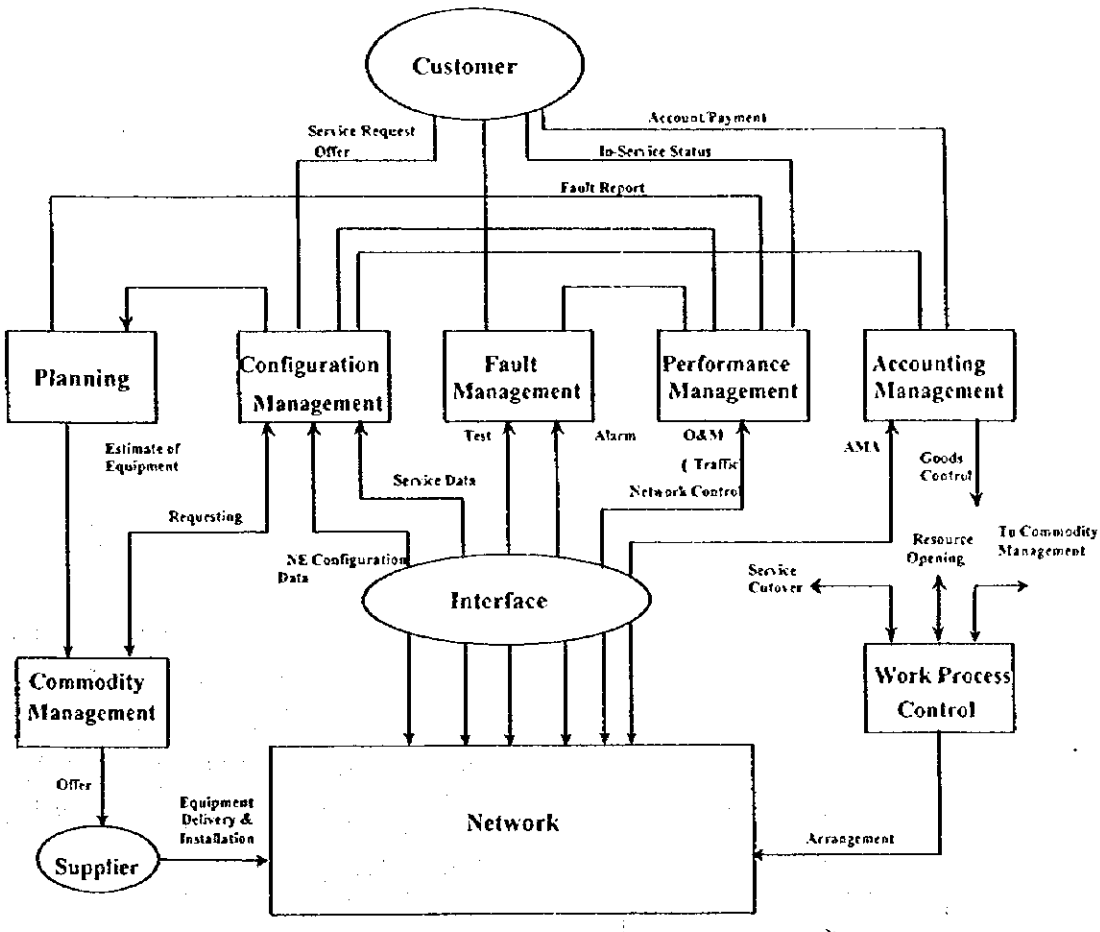


Figure 12.8.3-1 Function of Network Management

12.8.4 New Development in Network Management in the Framework of TMN

With the introduction of technologies like the Synchronous Digital Hierarchy (SDH) and optical fiber submarine cables, the capacity of the network is growing and equipment is becoming more advance. It has become more important than ever to manage these new resources efficiently, together with existing resources. In order to provide customers with high-quality services more quickly and at lower cost, it has also become necessary to coordinate management work on the various service networks, and when possible to centralize operations.

In Vietnam, currently management systems are targeted at specific devices. Management systems are provided by different vendors and implemented in different ways. This has led to inefficiencies such as the need to input the same data in several different systems. Each system has its own operating terminal and user interface, which increases the burden placed on management personnel. As new network are introduced and changes made to operating procedures, the systems gradually grow larger and more complex, to the point where maintenance costs have become a significant issue. These problems are all the more serious in view of the increasingly complex requirements foreseen for telecommunications network management in the future. In this context VNPT is requested to decide to develop a new integrated network management system based on TMN technology and standard components in the timeframe between the year of 2000 and the year of 2005. The aim is to assure the provision of stable, high-quality communications services while controlling the costs of network management.

(1) Architecture of the integrated transport network management system

To provide the flexibility needed to respond to changes in user requirements and network configuration, it is important to distribute data and management functions and to adopt standard specification. Vietnamese integrated network management system should adopt the TMN function architecture. It structures the system in a multi-layered hierarchy with separate layers for network element management and transmission path management. It also provides functional divisions within each level. The network element management layer needs to handle equipment of various kinds, such as SDH and PDH (Plesiochronous Digital Hierarchy) transmission terminal equipment, optical fiber cables and satellite communication systems. Systems were developed for each type of equipment, and distributed to each station. The functions needed for management, monitoring, and control of specific types of equipment shall be provided on an individual basis. Each individual system can also provide data

over a common interface to upper-level transmission path management functions. In the transmission path management layer, an effort is made to achieve the maximum distribution of basic functions such as configuration management, monitoring, testing, and control. All of these functions can be utilized separately, and also combined to provide more advanced functions for transmission path provisioning, restoration, trouble ticket management, and other services for network operators and service managers.

(2) Common management interface

The interface between the network element management layer and the transmission path management layer is based on the standard interface defined in the TMN recommendations. Standard interface shall be also used for the interfaces between each system in the transmission path management layer. These standard interfaces shall be optimized in accordance with the operating conditions in VNPT network and implemented for communications between all systems. This allows the same data to be input for geographically distributed network elements and transmission paths. It also enables integrated control and testing from a single terminal, instead of requiring a number of different terminals for different systems. As the network grows and new network elements are added, the common network management interface will make it easier to accommodate the new elements in the transport network management system. Figure 12.8.4-1 shows the conceptual model of a TMN Transport Management System.

The introduction of the integrated network management system will mark the beginning the TMN at VNPT, with the TMN concepts and technologies applied to the entire transport network. This will help VNPT meet the challenge faced by all communications service providers, of providing high-quality services at the lowest possible cost. Without such a system, it would be impossible to meet this challenge.

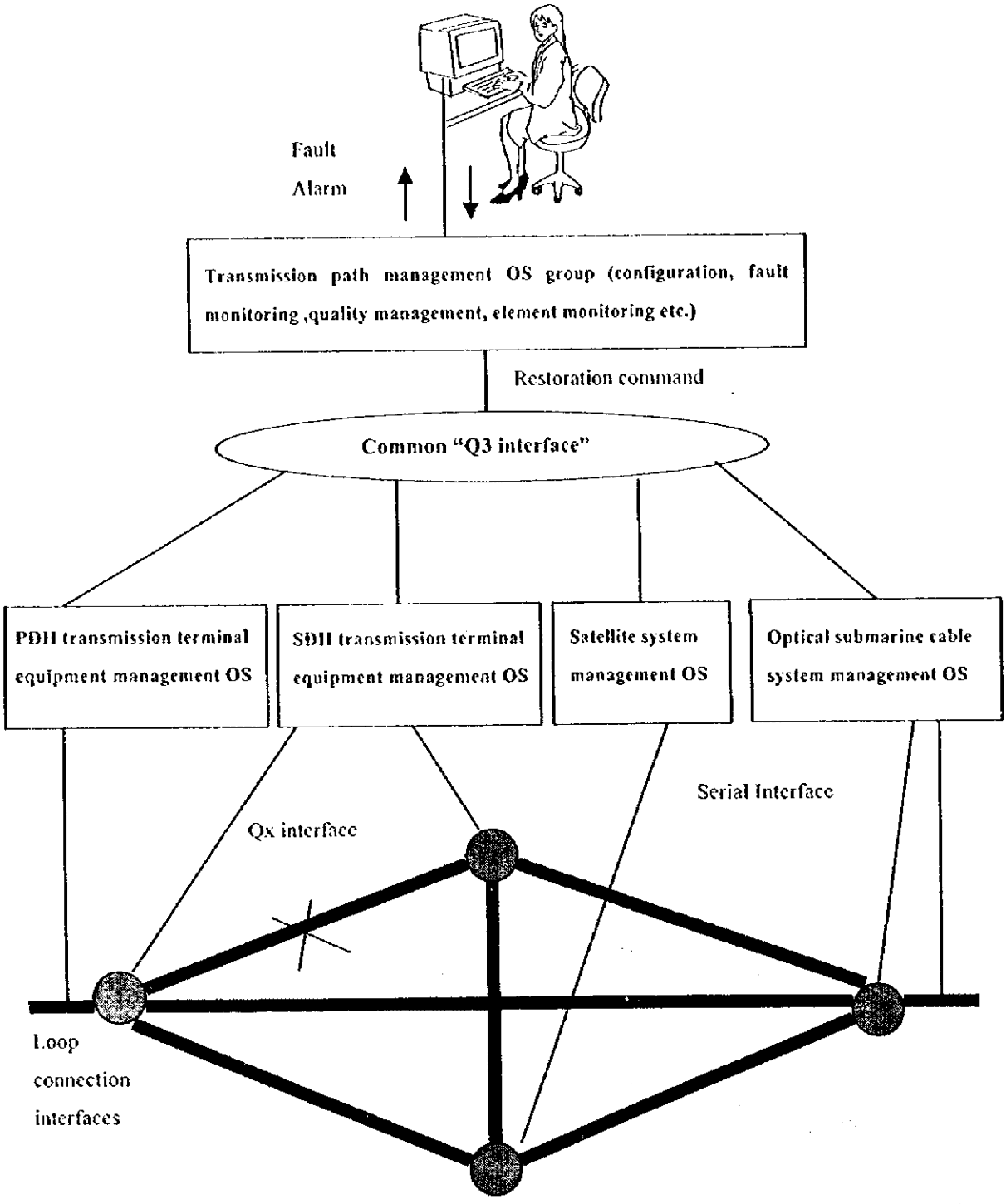


Figure 12.8.4-1 Conceptual Model of TMN Transport Management System

12.9 Operation and Maintenance Improvement Plan

12.9.1 Organization and Job of Operation and Maintenance

(1) Four Level Operation and Maintenance Architecture

As of the end of 1998, a size of the telecommunication network in Vietnam has made a great progress in the development in the fixed telephone subscription, in mobile telephone, data communications with Internet service as shown in the followings:

(a) Telephone subscriber : 1,706,974 main lines (2010: about 7.5 millions)
(b) Telephone Density : 2.06 telephone per 100 people
(8.32 telephone /100 people)
(c) Mobile Telephones : 264,290 (2010: about 3.8 millions)
(d) Paging : 132,305
(e) Internet : 11,300 (2010: about 100 thousand)

However, in 12 years later or the year 2010, the size of Vietnamese telecommunications network may be expanded to the order of 7.5 millions for the fixed telephones , 3.8 millions for the mobile telephone and 100 thousand Internet.

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 and existing main carriers of VNPT, VIETEL and Saigon SPT.

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.

In this respect , 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.

For the side of the Headquarters, the Headquarters staff will be relieved from the operational and managerial jobs and will be able to devote themselves to work on administration policy decisions and the like.

The Transfer of Headquarters task to lower level should be started from the Operation and Maintenance functions and jobs. The architecture of functional organization in 4 levels is shown in Figure 12.9.1-1

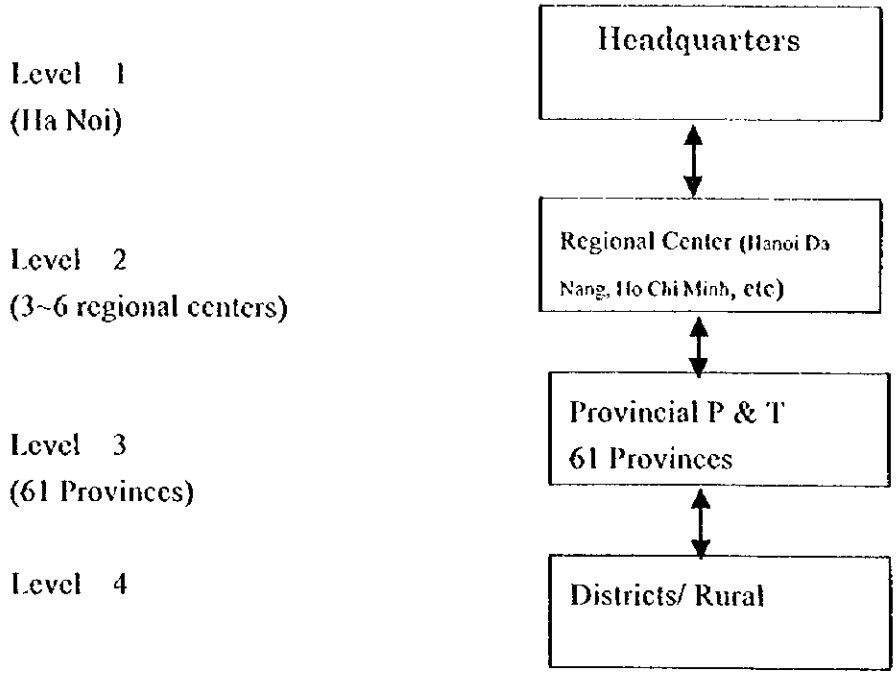


Figure 12.9.1-1 Four Level Architecture of Operation and Maintenance

(2) Task and Job

(a) Level 1: Headquarters Level

Headquarters level job should be concentrated to administrative jobs such as;

- Preparation of operation and maintenance policies
- Issuance of instructions
- Standardization of methods and procedures for maintenance and operation
- Negotiations and liaison with other Headquarters divisions and domestic/ foreign parties
- Budget planning and approval
- Administration of finance, work performance, quality of service, network management

(b) Level 2: Regional Level (Numbers of levels ;3~6)

Functions of the Regional Level (Number of levels is subject to organizations such as VTN, VTI, VMS, PGC, VNN, etc.) should be such as;

- Improvement of network and fault administration

- Trouble shooting for operation and maintenance
- Monitoring, analysis, instruction for improvement of traffic, quality of service performance indicators and reporting
- Spare parts (equipment and materials) control and administration

(c) Level 3/Level 4: P& T and District Level

Functions for P & T and District Levels should be such as;

- Day to day operation and maintenance works
- Customer relations
- Material management
- Intra-Province projects and new connections
- Periodical measurements of traffic, fault control, quality of service and performance indicators and 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.

12.9.2 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.

The PDCA (Plan, Do, Check, Action) Cycle is an adaptation from the Deming wheel.

The Deming wheel stresses the need for constant interaction among activities of research, design, production and sales development and the PDCA asserts that every managerial action can be improved by careful application of the sequence ; Plan, Do Check and Action.

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.

Do: Once the plan has been finished, this is implemented by applying the above plan

Check: The implementation is checked to see whether the anticipated improvement has been brought about or not.

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.

A concept on the PDCA Cycle are illustrated in Figure 12.9.2.-1.
In addition to this, a procedure of problem solving cycle which shows a way of solving problems by applying the above-mentioned PDCA Cycle is also shown in Figure 12.9.2-2.

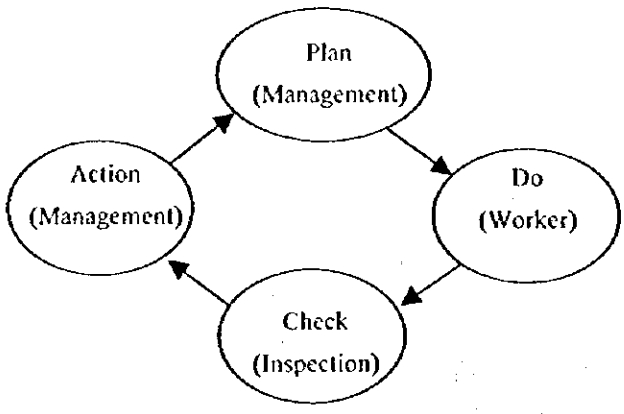


Figure 12.9.2-1 PDCA Cycle

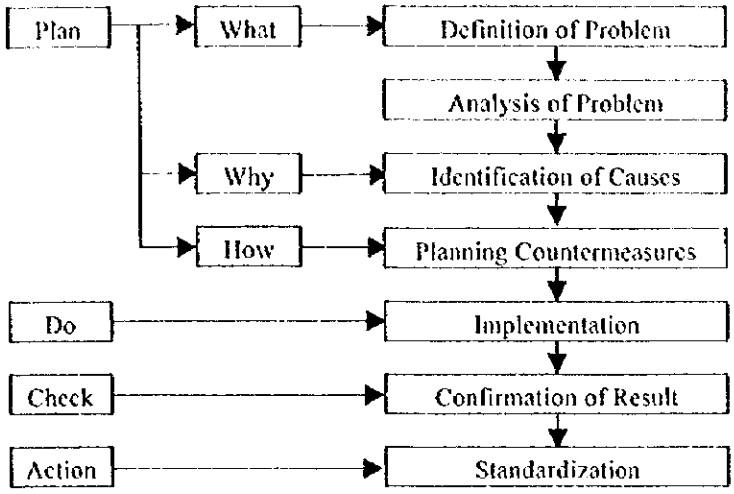


Figure 12.9.2-2 Problem Solving Cycle

12.9.3 New Connections for Service Application

The delay in new connections is caused by infrastructure shortages such as switches, primary cables and secondary cables and inadequate service order management. Countermeasures against infrastructure shortages are discussed in the next sub-section for the improvement of Operation and Management. This covers the improvement on the service order management.

12.9.4 Service Order Procedure

(1) Subscriber Registration

The present documents related to service order should be simplified if they are complicated. Improvement items for improvement are such items as i) the adoption of a new registration form which includes route diagram for customer premises and items necessary for service order process ii) the simplification of other relevant documents to be processed by P&T needs to be done.

(2) Application List Management

Basic analysis concerning where customer premises are located is not sufficient. Confirmation of customer data such as the exact address and place and analysis such as area-wise sorting / DP -wise sorting should be promoted. The another improvement plans are described in paragraphs of CSS (Customer Service

System) Billing System .

(3) Plant Record (Location Map) and Loop Assignment Record

The management of the original drawings should be centralized in the drawing office at Subsidiary company and / or at P&T . Updating must be also done by the drawing office based on drawings sent from contractors after finishing construction. However, there are some cases where both the original drawings at the drawing office and plant records at related organizations have not been updated because drawings have not been sent when there have been small scale installations or installations by the concerned employees.

(4) Priority (Order of New Connections)

The following should be done in order to provide customers with available facilities as quickly as and as much as possible : i) available facilities by area or by DP should be provided regardless of application conditions in other areas or DPs (even if there are customers with higher priority in other areas or DPs) and ii) new connection work related to the same area or the same DP should be done together in the interests of work efficiency.

(5) DP Allocation

For more prompt DP allocation, work should be done not only by a main office but also by a remote area office staff who are well informed about the circumstances in local areas.

12.9.5 Plan, Do, Check and Action on New Connection

In order to apply the above-mentioned PDCA Cycle, the following measures need to be carried out:

(1) An annual plan needs to be proposed by both the operation line (staff --> Manager --> Deputy Director --> Director) and the project line and this is to be adjusted by the planning/construction section during the annual business planning procedure.

(2) For quicker installation by Company/P & T employees, annual targets for Company/ P & T employees and unit rate contractors need to be set up.

(3) For stronger coordination between the project line and other offices, project manager need to do the followings:

- To explain the scope of the work and give a hearing to other office concerned before the start of the project.

- To explain progress, analyze problems, discuss countermeasures and attempt to solve problems.

12.9.6 Improvement of Telecommunication Service Quality

In order to improve the reliability and productivity of telecommunications sectors throughout, it may be urgent to set up a standardized target and levels of telecommunications quality control (fault rate, successful call completion rate and repair time)

12.9.7 Failure Control and Spare Part Storage

Failure rate can be calculated by applying the Formula MTBF (Mean Time Between Failure) as explained in CHAPTER 6. It may be 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. And the organization should be set up for this control.

CHAPTER 13

HUMAN RESOURCE DEVELOPMENT PLAN

CHAPTER 13 HUMAN RESOURCE DEVELOPMENT PLAN

13.1 Current Status of Organization and Staff

13.1.1 Present Staff Situation

(1) Staff Structure by Academic Background

As described in the foregoing Chapter 3, the telecommunication sector of DGPT was split into a regulatory entity which keeps the name of DGPT and operating entity: VNPT in 1995.

As for the telecommunication manpower figures, the total staff of DGPT is estimated at about 400, while VNPT has a total of about 40,000 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..

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 as shown in Table 13.1.1-1.

Table 13.1.1-1 Present Status of Staff Structure by Academic Level

Items	No. of Staff	Percentage	Remarks
-Workers	27,100	68 %	Estimated
-Technicians & Senior Technicians	5,600	14 %	Estimated
-Engineers	7,200	18 %	Estimated
Grand Total	40,000	100 %	
Teledensity	1.83		
Telephone Lines per Staff	35		

Source: DGPT/JICA Pre. Study Team (Feb. 1998)

As for the past data, DETECON made a study on the staff structure in ITU Project EQ/VIE/89/009 Report issued in 1993. The Report describes that the "existing staff" is an estimate on the available data from 40 out of 53 provinces. The structure by academic level and age is derived from the limited database, although it's accuracy is limited.

According to DETECON's Report, the total number of telecommunication sector staff accounted for about 20,000 of which the majority (68%) was Workers, followed by Technicians/Senior Technicians (16.4%) and Engineers (15.6%).

Levels of Workers, Technicians, Senior Technicians and Engineers are usually determined by education.

A comparison between DETECON data and the present status of staff structure can be made on the estimation basis, as indicated in Table 10.1.1-2. The table shows that the percent of staff structure for three levels are almost the same between the data in 1992/93 and 1997/1998. However, the growth in the expansion rate of teledensity and staffing productivity are remarkable; the number of telephone and teledensity growth rate of 97/98 is more than 5 times as much as 92/93.

Transition in the staff structure between 92/93 and 97/98 is shown in Table 13.1.1-2.

In this connection , the number of telephone subscriber , teledensity and their associated figures for 97/98 are made to a rounded number.

Table 13.1.1-2 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

(2) Staff Structure by Professional Specialty

In addition to the study on the staff structure by academic level, another analysis on a classification by professional specialties is also important for the human resource development plan.

According to the data obtained from the study, the professional specialties of the current staff structures may be shown in Table 13.1.1-3 as an estimated basis.

Table 13.1.1-3 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

On the other hand, as the data in 1993, ITU Report (DETECON) described the staff structure of the telecommunications sector as follows.
The total number of qualified "Technicians" are classified into three categories by professional specialties:

Technicians	3,250 (100%)
Switching	950 (29%)
Transmission	1,800 (59%)
Outside Plant	500 (12%)

According the above percent, when ITU Report was issued in 1993, the percent of Outside Plan was rather low than Switching (29%) and far lower than the Transmission.
This situation has been changed drastically as the telecommunication sector has made a great progress in quantity (number of telephone subscribers, for example) and quality (new technology, technical innovation, new services, network management, planning and designing).

13.1.2 Staffing Productivity

(1) Present Situation

According to ITU "World Telecommunication Development Report 1997/1998", the number of telephone lines per staff accounts for about 35 as of the end of 1996. This can be defined as a staffing productivity, because the number of telephone lines is an indicator of productivity-it may be referred to as staffing productivity.
The figure shows that the Vietnam's telecommunication sector has a rapid increase in the staffing productivity among ASEAN countries.

On the other hand, according to National Development Plan, Vietnam will basically become a developed country. To make a comparison of staffing productivity in relation to the telephone line per staff among some developed countries may be very significant; Australia, Canada, France, Germany, Japan, Sweden and U.K

As Table 13.1.2-1 shows, the average number of telephone lines per staff in seven (7) developed countries chosen for the reference accounts for approximately 150 lines per staff in 1990 and 220 in 1996. In the connection, the lowest figure in

1990 is 89 for Australia and the highest 200 for Japan, while the lowest figure is 118 for Australia and the highest comes from Sweden for the year 1996.

The average staffing productivity of the sampled developed countries may be about 3.5-4 times higher than that of Vietnam.

Table 13.1.2-1 No. of Telephone Line per Staff in Developed Countries

	No. of Staff			Telephone Line per Staff		
	1990	1996	CAGR	1990	1996	CAGR
Australia	87.0	80.3	-1.3	89	118	4.8
Canada	98.2	82.1	-2.9	156	220	5.9
France	155.8	166.4	1.1	180	198	1.6
Germany	212.2	213.1	0.2	150	205	5.3
Japan	272.3	213.1	-4.0	200	289	6.3
Sweden	42.3	19.9	-11.8	138	304	14.0
U.K	226.9	141.0	-7.6	112	190	4.1
Average				146	218	

Note: CAGR; Compound Annual Growth Rate , derived
Source: ITU World Telecommunication Development Report 1997/1998

13.2 Human Resource Development Plan

13.2.1 Present Human Resource Development Strategy

Human resource management and development is regarded as a very important device to realize the transformation which DGPT and VNPT are planning as the key strategy.
The strategy of GDPT and VNPT is focused on the following three (3) items :

(1) Change Attitude of Existing Staff to Customer Services and Cost Performance
Since two (2) new operators - Vietel and Saigon Postel - have been allowed by the Vietnamese Government to provide telecommunications services, this means that competitions have been introduced. Therefore, it is necessary to change the attitude of the existing staff to direct customer services focus and cost awareness.

(2) Skill of Network Management
The network is expanding so fast and rapidly. This requires more emphasis on the upgraded and advanced skill for the network management.

(3) Activation of Existing Staff
In spite of the fact that digitalization technology has been introduced by changing

the analogue technique to the advanced technology, it is necessary to make a substantial effort to retain the existing staff for further activation of the organization activities.

(4) To train the staff to meet convergence of communication, computers and broadcasting

(5) To provide a good quality of instructor's ability with present instructors in Training Centers

(6) To set up the Human Resource Development policy in order to encourage the staff ability

13.2.2 Present Targets

In order to promote the above-mentioned strategy, strengthening the human resource development plan including training facilities is regarded as an important and urgent issue. For the training issue, more focus is put on the strengthening of training and retraining on the skill upgrading and attitude improvement in addition to the classical approach oriented at knowledge.
For this purpose, the telecommunications sectors (DGPT, VNPT) intend to take into account the competence development into wider perspective of human resource and organization.

Major items for human resource development which exist and/or are under implementation in DGPT and VNPT are as follows:

(1) Staff Training
(2) Performance Appraisal
(3) Job Description
(4) Promotion Policies
(5) Recruitment and mobility

As it is understood well, human resource development means in particular "training". Training is regarded as the most important instrument to execute the above-mentioned human development strategy and the major items for human development. In this connection, the existing training situation will be described in succeeding sections.

13.3 Existing Training Situation

13.3.1 Present Training Organization

Under the direct responsibility of VNPT, two (2) training centers are operational to provide training for middle level staff.
Training Center 1 is situated in Ha Noi and Training Center 2 is located in Ho Chi Minh City. Also, under the responsibility of VNPT, there are three (3) workers schools: one in Ha Nam, one in Thai Nguyen and one in Da Nang. A fourth workers school is located, and now in operating under the responsibility of Training Center 2.
The workers schools provide training for lower staff. The training centers and workers schools perform a wide variety of the mostly standardized training for both posts and telecommunications.

Before 1985, VNPT used to have its own Communications University. After 1985, this university was changed into Training Center No.1 by the Vietnamese government. It trains up to the junior college level. In order to satisfy the need for training of high level staff a Post and Telecommunication Academy has been established. To this Institute, the existing Telecom Research Institute has been also integrated, creating an Institute which can provide research and training at university level.

Apart from training provided by the Training Centers and the Workers Schools, staff is also trained by outside sources as shown in the followings:

- Ha Noi, Da Nang and Ho Chi Minh City --Universities
- A broad on the variety of fellowships, grants, ODA, BCC, etc.
- Regional training centers such as APT-, ITU-workshops, etc.
- Independent training centers in Vietnam

13.3.2 Training Programs

The training provided by the Training Centers and Workers Schools can be divided into three (3) major areas;

(1) Technical Fundamental Training
Basic and advanced technical training are provided for workers, technicians and engineers.

This type of training (Type 1) takes from two (2) years for technicians to four (4) years for senior technicians. The curriculum is developed in close cooperation with DGPT. Students have to pass a formal entry test before they can attend this type of long-term training courses. After the examination, students receive an official certificate. Most of these students will get a job within VNPT or its subsidiaries. The government funds this Type 1 of training which is 60% of the total VNPT effort.

(2) Professional Training

These short-term courses are strictly focused on the needs of internal VNPT. The period of the course (Type 2) is 6 months at the maximum. These courses should reflect the needs of operational units of VNPT. These courses are funded by VNPT and provincial P&T.

(3) General Fundamental Training

This training course (Type 3) involves a fundamental and general training, for instance, training course for languages, computer skill, etc.

Every body who wants to pay the course fee is allowed to attend the open and/or general courses of this Type 3. At this moment this type of courses form 30% of all courses.

The Training Centers are developing the course curriculum of this type of courses itself.

(4) Remote Learning on Pilot

13.3.3 Training Number on Training Organization

The total umber of staff involved with training is approximately 700. About of these are directly involved with teaching (teachers and lecturers). Approximately 90 % of the lecturers and teachers have a university degree.

The existing training facilities can deliver the training each year as described in the followings:

(1) Basic Technical Training

- For Technicians 600
- For Senior Technicians 600
- For Workers 1,200

Every level students are fresh graduates from secondary schools as well as VNPT staff who are selected for upgrading.

(2) Short Term Courses

Short term courses (refreshment, additional) afford to provide a total capacity of about 1,200 – 1,500 per year in Training Centers and approximately 8,000 per year in 3 Workers Schools

13.4 Present Situation of Education/Training System and Hierarchy

The present situation of education/training system and hierarchy may be illustrated in Figure 14.4-1 based upon the foregoing data and information.

Although a strict hierarchy system is adopted by Telecommunication Sector for the levels in accordance with the academic background or educational cadres, everyone can be promoted if he or she graduates from one of the long-term courses at the Training Centers.

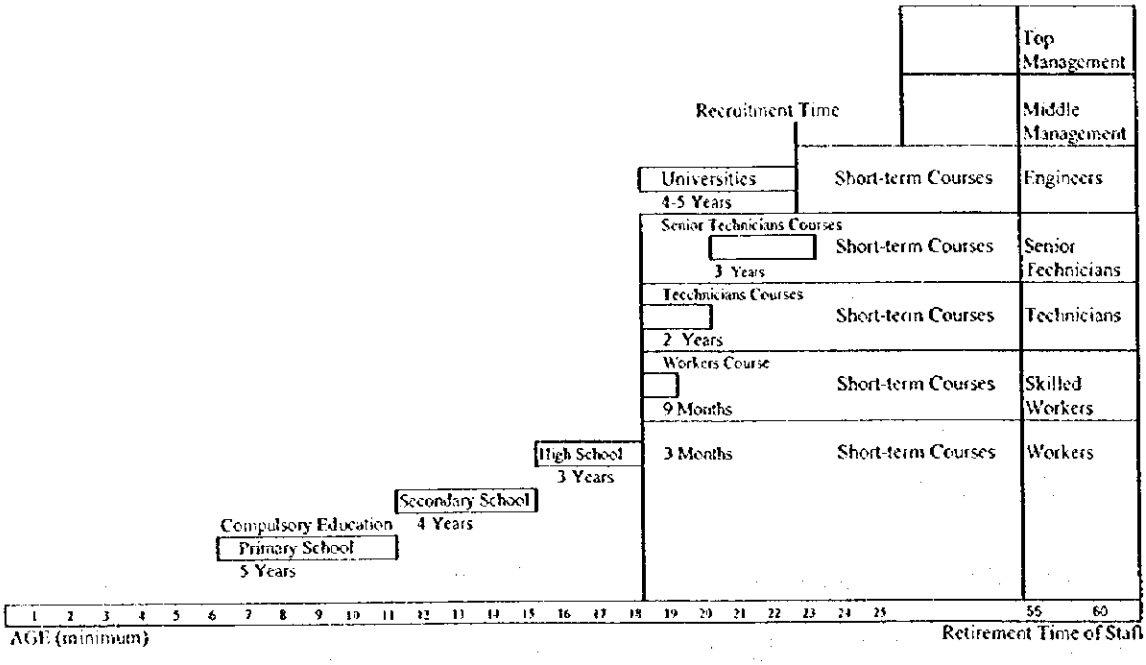


Figure 13.4-1 Education / Training System and Hierarchy

As mentioned above, the number of existing staff for telecommunications sectors of DGPT and VNPT is about 40,000. Among them, approximately 68% is workers, 14 % is

Technicians and Senior Technicians and 18% accounts for Engineers. It is assumed that by the 2000, a total of 20,000 persons will be recruited.

13.5 Human Resource Development Approach

13.5.1 Estimation Method of necessary Number of Telecommunications Staff

(1) Macroscopic Estimation Method

In the ITU Report for Telecommunications sector recommended that the estimation method of the required number of staff has a close correlation between the number of subscriber line per 100 inhabitants (this means teledensity) and the grow rate of subscriber telephone lines per staff(employee). This estimation approach is called as a macroscopic estimation method which is used at large in the world, although other methods are also recommended in some cases where the financial data and information of telecommunications operators would be sufficiently available for the planner.

As described in the above-mentioned sub-sections and paragraph (for example Sub-section13.1.2 and Table 13.1.2-1), the growth in the required number of staff increased rapidly from1992/1993 to 1997/1998. However, in parallel with the increase in the number of staff, the growth rate in "per staff telephone line" went on increasing during this period to reach a level of reasonable productivity in Asian countries and even being compared the Vietnamese Telecommunications Productivity with an average figure in the world.

From this reason, the necessary number of staff can be estimated by using the number of subscriber lines each year and the past growth of lines per staff as the Macroscopic Estimation Method.

On the other hand, this Macroscopic Method will provide a long-term planning target in human power planning and strategy but another method will be necessary for calculate a required number of staff on a short-term basis and on a business category basis for the management purpose. For this reason, a microscopic estimation method must be studied in this report.

(2) Microscopic Estimation Method

For the purpose of estimate the necessary number of telecommunications staff by

using a microscopic method, a work/job classification and description have to be clarified at the beginning. After this process , an estimation criteria and /or regulations must be standardized to eventually calculated the necessary number of staff in each organizational unit or work group.
The typical methods will be described in Sub-section 13.5.3.

13.5.2 Staffing Plan by Macroscopic Estimation Method

(1) International Model

The macroscopic estimation is performed by applying the formula of historically regressed curves for respective 44 independent data in relation to main lines and the number of staff available obtained from 39 ITU member countries and five (5) country groups that have been selected from "World Telecommunication Development Report 1998 ITU" , as given in table 13.5.2-1 and 13.5.2-2.

(2) Correlation Formula for Teledensity and Productivity (No. of Main Line per Staff)

The correlation formula between the telephone main line and the number of the main line can be obtained by using data given in both tables mentioned above.
The obtained correlation formula is expressed for a linear equation as shown in the followings:

Y = 3.16 18X + 40.917
Where, Y means the Number of Line per Staff
X represents Telephone Density

(3) 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 in relation to the productivity, demand forecasting results mentioned in Chapter 7 in this Volume from the past time1998 up to year 2020 covering the telecommunication development plan. Table 13.5.3-3 shows interrelated indicators of three demand forecasted scenarios , the number of staffs and the productivity for the Human Resource Development up to 2020.

(4) Estimation for Staffing Plan and Productivity

Relationships between the time and the productivity are illustrated in Fig. 13.5.2-1 in relation to the demand forecasting scenarios up to 2020.

Table 13.5.2-1 Indicators of Telecommunications Employees (ITU 1992)

Country	MTL*1000	Population*1000	Employees	MTL/Employee 1992	MTL/100Pop 1992
Afganistan	37	16,433	1,550	23.87	0.23
Bangladesh	250	118,745	19,300	12.94	0.21
Bhutan	2	1,551	350	6.86	0.15
Cambodia	6	8,807	400	13.75	0.06
D.P.R.Korea	820	22,195	19,000	43.16	3.69
Fiji	46	741	935	48.77	6.15
Indonesia	1,277	187,765	41,134	31.04	0.68
Iran (I.R.)	2,456	57,727	65,345	37.59	4.26
Kiribati	1	66	96	13.23	1.92
Lao P.D.R.	7	4,262	931	6.98	0.15
Malaysia	1,817	18,333	28,797	63.09	9.91
Maldives	8	223	254	30.04	3.42
Micronesia	3	101	128	20.31	2.57
Mongolia	69	2,250	6,000	11.42	3.04
Myanmar	76	42,561	6,478	11.75	0.18
Nepal	65	19,605	3,546	18.42	0.33
Pakistan	1,116	115,520	54,084	20.64	0.97
Papua New Guinea	34	3,772	1,472	23.03	0.90
Philippines	648	62,868	17,501	37.02	1.03
Solomon Islands	5	330	270	16.67	1.36
Sri Lanka	126	17,247	7,396	17.01	0.73
Thailand	1,553	56,923	24,840	62.53	2.73
Tonga	5	94	282	18.09	5.43
Vanuatu	3	163	100	30.00	1.84
Vietnam	100	68,183	26,000	3.85	0.15
Western Samoa	4	169	198	21.21	2.49
Lower Income	10,532	826,634	326,387	32.27	1.27
China	8,451	1,150,091	531,300	15.91	0.73
India	5,810	849,638	345,400	16.82	0.68
All Lower Income	24,792	2,826,363	1,203,087	20.61	0.88
Brunei Darussalam	39	273	900	43.44	14.32
French Polynesia	41	212	418	98.56	19.43
Guam	43	119	482	89.63	36.30
Hong Kong	2,642	5,755	15,449	171.04	45.91
Korea (Rep. of)	14,573	43,268	57,943	251.50	33.68
Macao	107	497	905	117.90	21.47
New Caledonia	32	170	271	116.24	18.53
Singapore	1,101	2,763	9,790	112.47	39.85
Upper Income	18,578	53,057	86,158	215.62	35.01
Australia	8,046	17,336	81,100	99.21	46.41
Japan	56,253	123,921	266,053	211.43	45.39
New Zealand	1,493	3,380	13,562	110.09	44.17
OECD Countries	65,791	144,637	360,715	182.39	45.49
Asia-Pacific	109,162	3,024,057	1,649,960	66.16	3.61

Source: ITU1998

Table 13.5.2-2 Indicators of Telecommunications Employees (ITU 1996)

Country	MTL*1000	Population (Mil.)	Employees *1000	MTL/Employee 1996	MTL/100Pop 1996
Afganistan	29	20.88			0.14
Bangladesh	316	120.07	19.3	16.38	0.26
Bhutan	6	0.60	0.5	12.20	1.02
Cambodia	8	10.27	0.7	11.57	0.08
D.P.R.Korea	1,100	22.47	15.0	73.33	4.90
Fiji	70	0.80	3.8	18.42	8.75
Indonesia	4,186	196.81	40.0	104.65	2.13
Iran (I.R.)	5,825	61.13	48.1	121.10	9.53
Kiribati	2	0.08	0.1	20.00	2.50
Lao P.D.R.	26	4.72	0.9	29.22	0.56
Malaysia	3,771	20.58	27.5	137.14	18.33
Maldives	17	0.26	0.4	41.50	6.38
Micronesia	8	0.13	0.1	82.00	6.31
Mongolia	93	2.35	5.1	18.14	3.94
Myanmar	179	45.92	7.2	24.81	0.39
Nepal	113	21.13	3.8	29.63	0.53
Pakistan	2,377	134.15	54.5	43.61	1.77
Papua New Guinea	47	4.40	2.0	23.50	1.07
Philippines	1,787	71.90	18.3	97.65	2.49
Solomon Islands	7	0.39	0.3	24.00	1.85
Sri Lanka	255	18.30	10.3	24.71	1.39
Thailand	4,200	60.00	35.0	120.01	7.00
Tonga	8	0.10	0.3	26.00	7.80
Vanuatu	5	0.17	0.2	22.50	2.65
Vietnam	1,186	75.18	75.0	15.82	1.58
Western Samoa	9	0.17	0.2	45.50	5.35
Lower Middle Income	113,701	1,170.62	1,353.2	84.02	9.71
China	54,947	1,232.08	481.4	114.14	4.46
India	14,543	944.58	421.1	34.54	1.54
All Low Income	79,685	3,258.10	1,231.8	64.69	2.45
Brunei Darussalam	79	0.30	0.9	87.56	26.27
French Polynesia	44	0.22	0.8	55.25	20.09
Guam	70	0.15	0.5	139.80	46.60
Hong Kong	3,451	6.31	38.0	90.82	54.69
Korea (Rep. of)	19,601	45.55	66.6	294.31	43.03
Macao	162	0.44	1.0	161.50	36.70
New Caledonia	46	0.19	0.3	152.00	24.00
Singapore	1,563	3.01	6.0	260.45	51.40
Upper Middle Income	58,824	440.36	400.0	147.06	13.36
Australia	9,500	18.31	80.3	118.31	51.88
Japan	61,526	125.76	213.1	288.72	48.92
New Zealand	1,782	3.57	9.1	195.82	49.92
High Income	491,442	909	2,353	208.88	54.06
Asia	206650.5	3431.85	1,824.5	113.26	6.02

Source: ITU 1998

Table 13.5.2-3 Required Number of Staff and Productivity in Vietnam

Year	No. of Lines (thousand)	Teledensity Scenario-3	Productivity (No. of line per staff)			No. of Staff (Scenario-3)
			Scenario -1	Scenario -2	Scenario -3	
1998	1,791.97	2.33	48	48	48	37,332
1999	2,099,47	2.68	49	49	49	42,846
2000	2,398.30	3.01	50	50	50	47,966
2001	2,778.14	3.43	51	51	52	53,425
2002	3,176.39	3.86	52	53	53	59,931
2003	3,597.48	4.30	53	54	54	66,620
2004	4,046.51	4.76	54	55	56	72,262
2005	4,529.04	5.25	55	56	57	79,456
2006	5,050.92	5.77	56	58	59	80,608
2007	5,618.28	6.33	57	59	61	92,102
2008	6,237.55	6.93	59	60	63	99,008
2009	6,915.55	7.58	60	62	65	106,393
2010	7,659.56	8.29	61	63	67	114,321
2011	8,477.44	9.06	62	65	70	121,110
2012	9,377.67	9.91	64	67	72	130,245
2013	10,369.45	10.83	65	69	75	138,259
2014	11,463.06	11.84	67	71	79	145,102
2015	12,669.47	12.94	68	73	82	154,505
2016	13,809.32	13.96	70	76	85	162,462
2017	15,061.78	15.08	72	79	88	171,156
2018	15,876.41	1574	74	81	91	174,466
2019	16,936.31	16.64	76	84	94	180,173
2020	18,093.59	17.62	78	87	97	186,531

Source: JICA Study Team

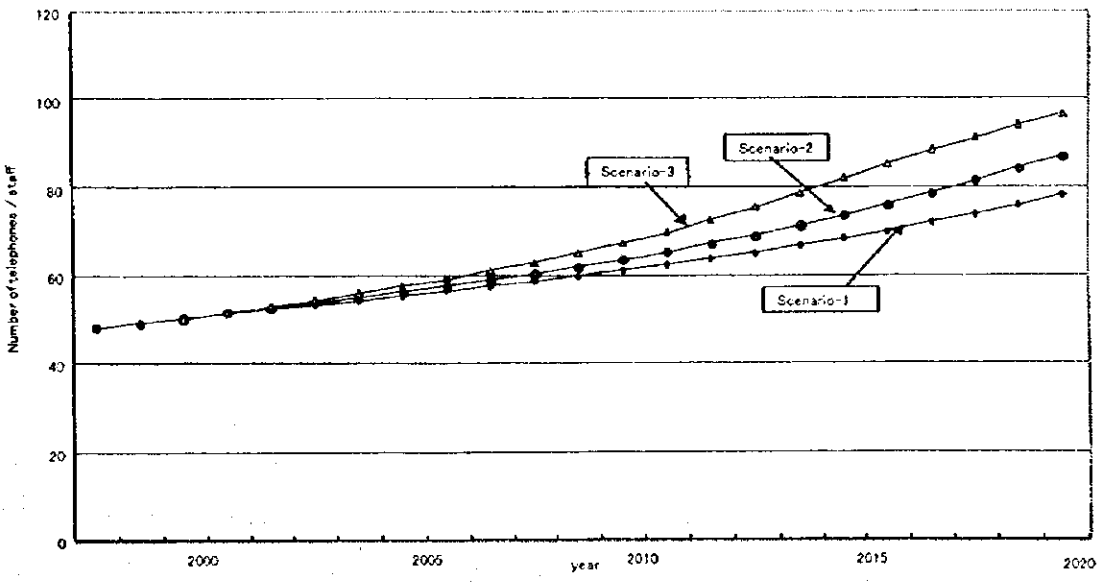


Figure 13.5.2-1 Growth in Productivity in Telecommunications Sector

13. 5. 3 Experience of Developed Countries

Experience of Developed Countries, there are significant differences between developed and developing countries in terms of the number of lines per employee. The number of the Philippines, India, Pakistan and is in the order of 50-100, indicating that the productivity in these countries is only one-third or one -fourth of that in developed countries. As spoken generally, the public corporation or special company business operation show higher management efficiency than do direct government operations. Accordingly, privatization will be more effective if telecommunications entities are shifted from direct government operations to public corporations or special company, with a financial management system close to self-supporting accounting to strengthen financial capabilities, then followed by privatization.

In addition to this, Table 13.5.3-1 shows that even in developed countries, the number of subscriber lines per employee stood in the range of 50 to100 when telephone density was around 10 percent (an average teledensity value of worldwide telephone lines in 1996). Currently, there are some developing countries which show level of productivity similar to that of developed countries at that time (34.54 lines for India, 43.61 for Pakistan, 97.65 for the Philippines in 1996 and 48 for Vietnam in 1998)

Table 13.5.3-1 Transition in Number of Lines per Employees in Developed Countries

Year Minimum Access Achieved (Teledensity is around 10%)		Number of Lines per Employee
Japan	Year 1967	About 50
UK	1963	About 50
France	1973	About 100
West Germany	1968	About 70

As mentioned above, developing countries including Vietnam may also be able to follow the process adopted by developed countries to improve management efficiency if the various policies and measures such as;

(1) The introduction of new technologies of digital switching system, SDH system and optical fiber cable to access networks. For example, Japan has implemented measures to improve management efficiency by positively incorporating the results of technological innovations ever since NTT Public Corporation was inaugurated in1952 and was privatized in 1985. These include the reduction in fault incidence reduced by half or 95 percent, depending on facilities) by the introduction of new

technologies(digital communications system and new access network facilities-optical fiber cable, etc)

(2) Office work innovations(computerization of office work),

(3) Decentralization of authority (transfer of authority from the head office to regional headquarters),

(4) Modernization of corporate management(management through setting goals)
As the result, in Japan, the number of subscriber lines per employee has substantially increased from 40 lines in 1964, 172 lines in1980, 211 lines in 1992 and 289 lines in 1996.

13.5.4 Suggestions for Staffing Plan and Productivity of Vietnam

In terms of specific business operations, the results of technological innovations should be positively be introduced and the management framework should be modernized, as was done by developed countries in the past. In order to successfully cope with the rapid increase in aiming a t the target goal of teledensity 10% up to 2010 in Vietnam and the accompanying increase in work volume that this may entail, the management rationalization and improvement are indispensable factors. Otherwise, development plans suitable for the actual situation of each subordinate organizations and provincial entities will be difficult to implement.
To this end, enhancement of ability of staff and training of managers and engineers described in this Chapter 13 of "Human Resource Development Plan" are also indispensable.

13.5.5 Adjusted Number of Staff and Productivity

(1) Preconditions for the Adjusted Number of Staff
ITU Report shows from 1993- 1998 about 3,400 staff have been increased for 6 years.
In 1993, there were about 20,000 staff in telecommunications sector (DGPT). In 1998, there are about 40,000 staff in all telecommunication sector including DGPT, VNPT subsidiary companies and other operators.
On the other hand, DGPT has a plan to increase telecommunications staff to about 50,000 staff in telecommunications field until 2000. Therefore, it is estimated about

5,000 staff will be increased in average from 1998 to 2000 theoretically. But if the technology innovations will be introduced in place and the management improvement will be realized as described in the above-mentioned sub-chapters of 13.5.3 through 13.5.4 the estimated number of staff will be decreased to the order of half of what has been calculated by the equation described in Sub-chapter 13.5.2.

(2) Substantial Productivity for VNPT

In addition to the fixed telephone lines (POTS: Plain Old Telephone Service), all VNPT staff do the works for the mobile telephone services, paging services, public payphone services, data communication services, Internet services, international services, etc. Therefore, if all telecommunications lines and facilities, such as the mobile, data, paging, payphone, etc. can be included into the fixed telephone lines by converting them to an equivalent fixed telephone line unit, the current productivity of VNPT staff may be elevated to the order of 55 lines per staff as a substantial value of productivity.

(3) Readjustment of the staffing plan

From the viewpoint of the preconditions for the adjusted number of staff and the substantial productivity of VNPT, the readjustment for the staffing plan should be carried out by taking consideration into the following items:

Additional subscriber increases in POTS, Mobile, Paging, Internet on annual basis

DGPT and VNPT policy for staffing plans

Other carriers plans

Introduction of new services and new technology

(4) Average increasing number of staff in telecommunications factors.

Based upon the above-mentioned estimation and conditions, the adjusted number of staff as compared in Sub-Section 13.5.2 is listed in Table 13.5.2-3.

Estimation conditions are as follows:

(a) up to 2000: The required number of staff will be 90% of the calculated number in Table 13.5.2-3. The number of staff in 1998 is fixed 37,400.

(b) up to 2005: The required number of staff will be 85% of the calculated number in Table 13.5.2-3

(c) up to 2010: The required number of staff will be 80% of the calculated number in Table 13.5.2-3

(d) up to 2020: The required number of staff will be revised as compared with the calculated number in Table 13.5.2-3

But for the convenience sake, it will be better to make it 75% .

Table 13.5.3-1 Adjusted Number of Staff and Productivity of Telecommunications

Year	No. of Lines (rounded)	Number of Staff (Estimated)	Productivity	Remarks
1998	1,791.000(2,026,000)	37,400	48(55)	The number of staff in 1998 is fixed as 37,400 90% of the calculated number of the equation
1999	2,099,000(2,349,000)	38,600	55(61)	
2000	2,398.300(2,787,300)	43,200	56(65)	
2001	2,778.140	45,500	62	The number of staff in 1998 is fixed as 37,400 90% of the calculated number of the equation
2002	3,176.390	50,100	64	
2003	3,597.480	56,700	65	
2004	4,046.510	61,500	66	
2005	4,529.040(5,779,040)	63,600	71(91)	
2006	5,050.920	68,500	74	The number of staff in 2005 is 80% of the calculated number of the equation
2007	5,618.280	73,700	77	
2008	6,237.550	79,300	79	
2009	6,915.550	85,200	82	
2010	7,659.560(9,826,560)	85,800	89(114)	
2011	8,477.440	91,500	93	
2012	9,377.670	97,700	96	The number of staff in 1998 is fixed as 37,400 90% of the calculated number of the equation
2013	10,369.450	103,700	100	
2014	11,463.060	108,900	106	
2015	12,669.470	115,900	110	
2016	13,809.320	121,900	114	
2017	15,061.780	128,400	118	
2018	15,876.410	130,900	122	
2019	16,936.310	135,200	126	
2020	18,093.590(23,043,590)	139,900	130(165)	

( )show the data when including mobile estimated data
Source: DGPT/JICA Study Team

13.5.6 Microscopic Estimations

The followings are references or examples for the estimation of Microscopic Method which are described in mentioned-above Sub-section 13.5.1:

- Commercial Section

  The number of required employees is estimated according to efficiency defined by using quantitative indexes such as the number of subscriber lines and the number of subscription requests.

  Efficiency must be defined and calculated for group categories such as regional groups and customer groups.

- Telephone Directory and Dial Service Assistant Section

The number of required employees is calculated by the following formula:

Operating load = 60 minutes / Average time when the operator service was required for one call

The number of required staff = Average number of calls per hour /Operating load

- Switching Section

Estimation of the required number of switching section.

The total number of required staff for a given line capacity is calculated by summing up the number of required employees in all job categories. One of the calculation examples for three cases of line capacity is shown in Table 13.5.4-1.

Table 13.5.4-1 An Example of Switching Section Staff

(Unit: Man)

LS (Line Capacity)	10,000	20,000	30,000
Maintenance Repairs	0.2	0.4	0.5
Regular Maintenance Tests	0.2	0.2	0.2
Regular Maintenance Jobs	1.4	2.1	2.7
Attached Jobs	0.5	0.8	1.0
Total	2.3	3.5	4.4

- Outside Plant Staff

An example of methods by which the required number of staff can be estimated for the ordinary telephone maintenance job is given in the followings:

$$E = \frac{F}{W \cdot \frac{D}{P}}$$

where

E : Required number of employees

F : Number of faults (a year)

W : Working days in a year, xxx days assumed

P : A repair job is handled by x persons.

D : Number of dealings in a day for repairs, x assumed.

- Administration Section

The necessary number of staff for this section can be obtained from an experienced data and an approximated estimation in which 10% of the total number of staff counted up in the four (4) sections mentioned above.
The present situation with staff allocation must be reviewed in order to make the necessary improvements to increase productivity. Since the number of administrative staff (specially clerks) is rather high, they should be reduced to a more appropriate level for its roles and functions.

(1) Service Indicators Necessary for the Number of Staff and Their Duties

The number of staff and their duties are closely related to service quality. The quality control of services must be uniformly administered throughout the country by universally setting standards which are coordinated with expansion of facilities. Table 13.5.4-2 shows an example of service indicators.

Table 13.5.4-2 An Example of Service Indicators

Commercial Section	Completion Rate for Service Orders within a Certain Period
Dial Assistance Section	Response Rate
Maintenance Section	Fault Frequency Rate, Fault Recovery Time

(2) Establishment of Staff Relocation and Re-assignment System

In order to develop the capabilities of staff and utilize the present human resource as much as possible, it is necessary to establish a method to relocate and re-assign staff.

13.5.7 Human Resource Management System

(1) Human Resource Management

For the purpose of establishing a proper human resource management plan, first it is necessary to monitor business activities such as work volume, service level and the capabilities of staff at the present time. Second, it is necessary to forecast business trend in the future and try to adjust for this.

Human Resources needs to establish a proper human resource management plan that should have:

- the service level as the target for staff allocation;
- the required manpower reflected by work volume, service level, and costs;
- close links with the operator total management plan and operation and

(2) Rationalization Plan

The introduction of new system such as NO.7 Signaling System, ISDN, Internet, Mobile Communication System, new technology and O/M systems of network management system, CSS, vehicle or computerized system for operation and maintenance can save manpower. It is necessary for the operator to establish and implement relocation and utilization plans to save manpower.

13. 6 Improvement for Human Resource Development Plan

13. 6. 1 Staffing Plan

According to the results of Development Study, the necessary number of staff for the telecommunications sector will be listed in Table 13.6.1-1. The staffing plan for each year is shown in the table. The manpower figures are estimated in accordance with the growth of subscribers by taking into account all aspects of telecommunication sectors such as the number of operators, organization, the kinds of services, quantities of subscribers of each service, expansion plan and the like.

Table 13.6.1-1 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	295	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

13.6.2 Improvement of Staff Structure and Job Classification

Out of the total number of the required staff or employees for telecommunications sector which are described in the above-mentioned Sub-Section 13.6.1, the total required staff must be shared in harmony and in effectiveness 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.
Important factors for reassignment of the total staff are as follows:

(1) Staff Structure by Academic Level
For the coming years, it will be necessary to increase worker's level and engineer's level as compared with the current situations

(2) Staff Structure by Professional Specialty
More emphasis should be put on administration/management, subscribers service, software development and operation/maintenance

13.6.3 Improvement of Telecommunications Productivity

Based upon the forecast for required number of staff up to year 2010/2020, the telecommunication productivity in terms of an indicator of telecommunication line per staff will be greatly improved if the current recruitment policy of employees will not be changed drastically in the future.
Modification data for the increase in mobile communications which are delivered by DGPT at the end of July 1999 show an increasing ratio of the mobile telephone by about 30% per year. Taking the modified data into consideration and a combined density ratio of fixed telephone and mobile telephone, a telecommunications productivity up to 2010/2020 from 1998 can be summarized in Table 13.6.3-1.

Table 13.6.3-1 Staff and Telecommunications Productivity

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	48(55)	55(61)	56(65)	71(91)	89(114)	130(165)

Source: DGPT/JICA Study Team
Note: ( ) shows the data when included the mobile data based on information by DGPT

As of 1998, the figures of the staff and the productivity account for 37,400 staffs and 48 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

and 50-56 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 2.5 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).

For further improvement in the Human Resource Development, the human resource development plan must be worked out in a such way that the staff has to make efforts for enhancing the services quality on one side and for achieving the expansion target of facility quantity on the other hand.

13.6.4 Staff Allocation Plan by Telecommunications Sector

(1) Staff allocation plan by telecommunications sector may be necessary to be worked out to carry out an efficient management of whole Vietnam. However, it will be very difficult to size up the manpower allocation plan for each sub-sector of telecommunications such as local network sector(for example access network of Provincial P & T) , a long distance network sector (for example, VTN), an international network sector (for example VTI), a mobile communications network sector, etc. according to the sector category in Vietnam without know the incumbent organization structure with magnitude of manning distribution.

(2) On the other hand, as the result of study for the telecommunications development in Vietnam , the recommendations are made to framework the state goals of telecommunications development targets, as described in summary in Chapter 16 of Volume I and the subsequent chapters of Volume II of Final Report.

(3) In sizing up the staff allocation for each sector of telecommunications in Vietnam, 9 types o the sector have been considered, as follows:
-Headquarters sector; DGPT and VNPT Headquarters level setor
-Local network sector; provincial P & T local network
-Long distance network sector; inclusive trunk network between Hanoi and Ho Chi Minh City and sumarine cable system
-International network sector; inclusive of VSAT and VINASAT
-Mobile communications network ; inclusive VMS, GPC, paging, other networks
-Data communications network; inclusive packet switching network, telex, Internet

-Private network; Lan/Wan, PABX, Leased Network, etc.

(4) Staff allocation may be useful in quoting percentage instead of an absolute figure. The staff forecasting can be shown in Table 13.6.4-1 with a sub-sector distribution.

Table 13.6.4-1 Staff Forecasting of Telecommunications Sector

Sectors	1998-2000	2001-2005	2006-2010	2011-2020
Headquarters Administration Sector	Less than 7% of total	Less than 5% of total	Less than 3% of total	Less than 2% of total
Local Network Sector Provincial P & T Sector	74.9%	70%	65%	58%
Long Distance Network Sector	5.4%	6%	8%	10%
International Network Sector	2,7%	4%	4%	5%
Mobile Communications Sector	4.3%	5%	7%	10%
Data Communications Sector	1%	4%	5%	8%
Private Network Sector	1%	3%	5%	7%
Other Sector	3.7%	3%	3%	-
Whole Staff Forecasting	37,000 (1998) 43,200 (2000)	45,500 (2001) 63,600 (2005)	68,500 (2006) 85,500 (2010)	91,500 (2011) 139,900 (2020)

Source: DGPT and JICA Study Team

% shows the ratio out of the total staff forecasting. ( ) shows the year

13.6.5 Improvement of Training Plan

(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) Countermeasure for Changes in Society and Fair Competition

Since the Vietnam's entry to international organizations to ASEAN, APEC, etc., the society and economy in Vietnam have been open to a competitive market. For example, in the telecommunications sectors, two (2) new operators have started to provide telecommunications services since 1999. Therefore, human resource development and training policy have to cover overall aspects, not limited to one operators.

(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 Training System and Development of Manpower

The success of VNPT and other operators depends on the efforts and ability/skill of individual staff, because the performance of enterprises will vary from manpower resources to fund/capital and facilities that are principal three important resources. It is expected that the telecommunications works will become larger-scaled ones and more complicated ones through the implementation of development plan.

Under these circumstances, in order to improve the telecommunication networks and to provide new customer services, specially, 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.

13.6.6 Planning for Human Resource Development

(1) Summarized Planning Factors

For establishment of human resource development, it is necessary to monitor the current business activities first and then to forecast the business trend in order to set up the rational plan for the Human Resources Development(HRD). The HRD 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 reflected by work volume, service level, and costs;
(c) close links with the operator total management plan and operation and maintenance plan of each division and unit;
(d) a macroscopic personnel plan which should be part of the manpower management and development policy and DGPT/VNPT plan which should be a guideline to coordinate the staff increase requirements from each division and unit.
(e) For 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 more in number and in skill.

(2) For the Preparation of New Services and Technology

(a) Human Resource Development Plan for Information technology

The human resource development plan for Information Technology should be implemented during this period.

(b) Relocation Plan of Manpower

During this period, not only new technologies such as ATM, IT, CDMA ,etc. abut also the target of 10 % 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 man power may be worked out in order to balance the assignment in both urban areas and rural areas.

(c) Improvement of Telecommunication Productivity

With the achievement or the targets of 10% penetration of main lines and new service introduction, an average line per staff should be over 70 per staff.

(d) Reorganization of Staffing Plan and Training Activities

Toward the year 2020, Vietnam will become an industrialized country in all aspects of industry infrastructure, including the telecommunications sector.

It is probable that a deregulation of telecommunications will be predicted for telecommunications sectors in Vietnam during this period. Therefore, reorganization of staffing plan and training activities should be worked out for the effective implementation as the timing will require.

(e) Training Development Plan for Multimedia and NII

Since Multimedia and NII will be introduced during this period, a new training development plan should be formulated.