



THE VIRTUAL PRIVATE NETWORK ON INTRANET FOR AUTOMOBILE BUSINESS

by

Ms. Duangchai Sukcharoen

A Final Report of the Three - Credit Course
CE 6998 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer and Engineering Management
Assumption University

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Project Title The Virtual Private Network on Intranet for Automobile Business

Name Ms. Duangchai Sukcharoen

Project Advisor Dr. Thotsapon Sortrakul

Academic Year November 2000

The Graduate School of Assumption University has approved this final report of the three-credit course, CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

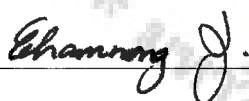
Approval Committee:



(Dr. Thotsapon Sortrakul)
Advisor



(Prof. Dr. Srisakdi Charmonman)
Chairman



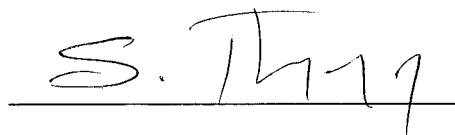
(Dr. Chamnong Jungthirapanich)
Dean



(Asst. Prof. Dr. Boonmark Sirinaovakul)
Member



(Dr. Prapon Phasukyud)
Member



(Assoc. Prof. Somchai Thayarnyong)
MUA Representative

November 2000

ABSTRACT

This project presents the implementation of the Virtual Private Network for Automobile business which is a tool to support the communication of a firm which has distributorship, dealership, branches, supplier or a nationwide customer base. The main objective of the project is to seek for tools to communicate between the head of office and 76 major branches from the provinces with the lowest cost while the existing application is not changed.

An existing network is studied and analyzed as well as the proposed network is designed to solve existing problems. This project will start from gathering information requirements from the users up to the development of the new network to meet user requirements. All tangible and intangible benefits are shown in this project.

The result of the network implementation prove that the firm can share proprietary information with their dealers, eventually also share selected confidential information with chosen users and business partners. Moreover, the capital and expenses reduce operation cost of sales and marketing and continue to maintain profitability in a global market. The cost comparison between the existing network and proposed network are presented and discuss in this project.

ACKNOWLEDGEMENTS

The researcher is indebted to the following people and organizations without them, this project would not have been possible.

The researcher wishes to express her sincere gratitude to her advisor, Dr. Thotsapon Sortakul for his advice, suggestions and recommendations about the concept of computer network design throughout this project study. His conception assistance, guidance, and constant encouragement has led me from the project inception to project completion. A grateful thanks are also due to all MS(CEM) Committee member, faculty and staff who have helped her with clarifications, criticism, and information during the making this project.

The researcher gives her thanks to the system engineer of Lwdnfo Co., Ltd. and her college who gave her important information. And special appreciation is due to the researcher's family, especially her mother who just passed away, she has always given the researcher the willpower. Above all, the researcher is forever grateful to her parents whose willingness to invest in her future has enabled her to achieve her education goal.

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I. INTRODUCTION

1.1 Background of the Project

Nowadays, the information is very important for every business. Especially communication using computer system within the organization to share proprietary information which saves cost and time to get the required information. Moreover, sharing information is needed not only within the organization but also its branches, distributors or dealers. They always need the right information in time so that they can make a right decision. The result is helping organizations enhance productivity and profitability.

Many organizations prefer to use the Internet, "an untrusted network", to communicate between organization and its branches, distributors or dealers. They expected that the Internet will help organization save cost in getting information because they will find the required information on Internet in a few time without any long distance charges or additional expenses. The Internet presents a variety of services, and the organizations can advertise their products or services to the world with the lower cost than ever before. It will help the organization to reach out a global pool of customers and thereby, increases its customer base and transcends the restriction of geographical boundaries like no other technologies. But it does have its trade-offs and weakness. It opens up many potential threats in terms of security. An attacker can first examine the packets flow in the communication between organizations with the use of a network sniffer. Over time, he will be able to gather and piece up precious information that facilitate him in mounting subsequent attacks.

By encrypting traffic messages become meaningless to onlookers in the Internet with a network sniffer employed. This increases the level of difficulties for any potential attacker in mounting an attack and one of Virtual Private Network security method is the encryption. This project aims are to explain how Virtual Private Network are becoming more essential than ever before and how it can serve sharing information between firm and its dealers.

1.2 Objectives of the Project

- (a) To design Virtual Private Network (VPN) on Intranet to communicate between organization and its dealers with lower long distance call charge than before and maximum security and capacity.
- (b) To design hardware, software specification and network configuration to meet the user's requirements.
- (c) To compare between the existing system and the implemented system.
- (d) To show the result in the implementation of the computer system that help the company to improving the performance of the operation and reducing the cost.
- (e) To make organization confidence with information transferring securities i.e. Corporate Policy, Production Information, Accounting Information, Sales Summary in each dealer will be disclosed only authorized persons.

1.3 Scope of the Project

The project will cover the following areas:

- (a) A computer system analysis and design plan for users' requirements.
- (b) A recommendation of hardware, software and telecommunication network
- (c) A budgeting for Virtual Private Network investment.
- (d) Implementation of Virtual Private Network on Intranet.

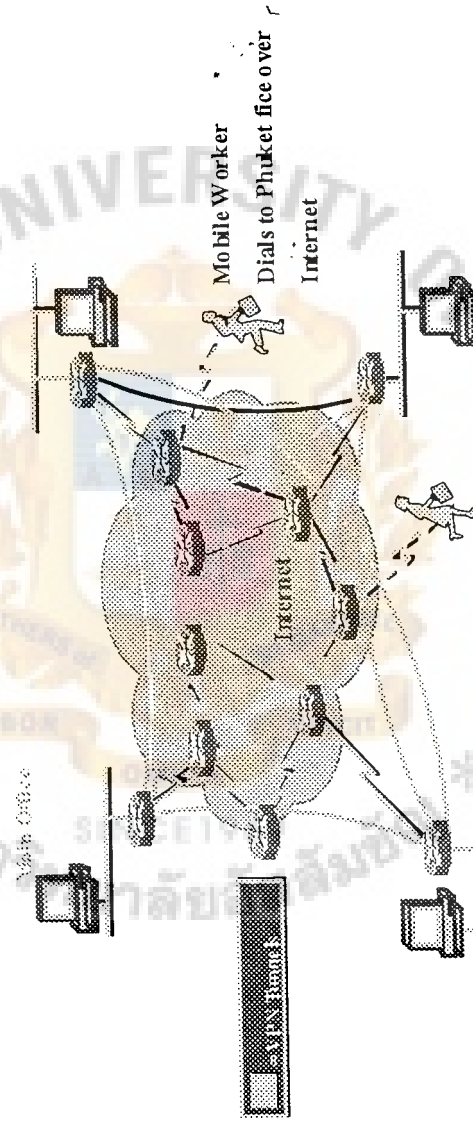
H. LITERATURE REVIEW

2.1 Overview of the Virtual Private Network or VPN

There is much hype in the industry currently concerning VPNs, their functionality, and how they fit in the enterprise network architecture. Simply defined, a VPN is an enterprise network deployed on a shared infrastructure employing the same security, management, and policies applied in private network. VPNs are alternative WAN infrastructures that replaces or augments existing private networks that utilize leased-line or enterprise-owned Frame Relay/ATM networks. VPNs do not inherently change WAN requirements, such as support for multiple protocols, high reliability, and extensive scalability, but instead meet these requirements more cost-effectively and with greater flexibility. A VPN can utilize the most pervasive transport technologies available today: the public Internet, services provider IP backbones, as well as service provider Frame Relay and ATM networks. The functionality of a VPN, however, is defined primarily by the equipment deployed at the edge of the enterprise network and feature integration across the WAN, not by the WAN transport protocol itself. The example of VPN is shown in Figure 2.1.

The target customer of VPN are the companies which has a branch office or mobile sales force or supplier or dealer in upcountry or has a nationwide customer base, the type of business i.e. consumer product, distributor, financial institute, franchise and direct marketing. And those companies is seeking for the tools to communicate between head office and 76 or major provinces branches with the lowest cost. Therefore, VPN is chosen to use for this proposal.

Private Networking Service Over a Public-Internet Network Infrastructure



2.2 Why VPN Was Considered

(a) Connectivity

- (1) User can connect to the nearest nodes to minimize long distance call cost.
- (2) Cost reduction from the existing media or expand the service to another media.
- (3) Company can use the existing applications, external communication, deliver service to the customer, including consolidate customer information to head office.

(b) Security

VPN is developed on the trust system. The security method such as encapsulation, encryption or authentication was taken to use implementation VPN. So we can assure that VPN is the acceptable security system.

2.3 Components of the VPN

VPN solutions are defined by the breadth of features offered. A VPN platform must be secure from intrusion and tampering, deliver mission-critical data in a reliable and timely manner, and be manageable across the enterprise. Unless each of these requirements is addressed, the VPN solution is incomplete.

The essential elements of a VPN can be segmented into five broad categories:

(a) Platform Scalability

Each of these elements must be scalable across VPN platforms ranging from a small office configuration through the largest enterprise implementations; the ability to adapt the VPN to meet changing bandwidth and connectivity needs is crucial in a VPN solution.

(b) Security

Tunneling, encryption, and packet authentication are necessary for transport security on public networks; in addition, user authentication and access control are essential for assigning network privileges and access.

(c) VPN services

Bandwidth management and QoS functions such as queuing, network congestion avoidance, traffic shaping, and packet classification, as well as VPN routing services utilizing Enhanced Interior Gateway Routing Protocol (EIGRP), Open Shortest Path First (OSPF), and Border Gateway Protocol (BGP) are essential elements of a VPN.

(d) Appliances

Firewalls, intrusion detection, and active security auditing are essential for comprehensive VPN perimeter security.

(e) Management

Enforcing security and bandwidth management policies across the VPN and monitoring the networks are necessary for a VPN solution.

These five key components of VPN solutions are delivered by Cisco within the context of open standards, scalability, and providing end-to-end networking capabilities.

Figure 2.2 below shows the component of VPN in the form of VPN building block.

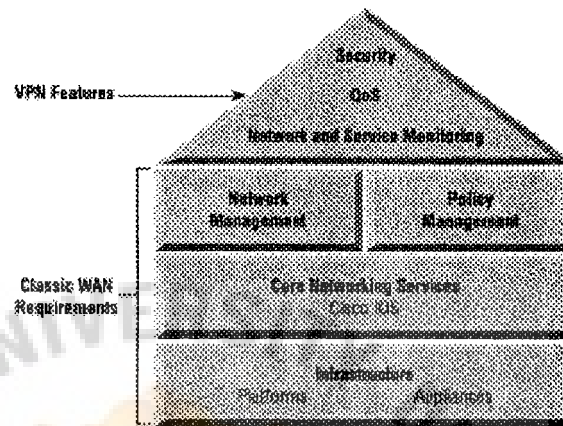


Figure 2.2. VPN Building Block.

Satisfying these VPN requirements does not necessarily require replacement of an existing wide-area networking infrastructure. Cisco VPN solutions augment existing WAN infrastructures to meet the enhanced security, reliability, and management requirements present in a VPN environment. The existing Cisco router portfolio is "VPN capable," with VPN features deployable through Cisco IOS software. In some VPN deployments depending on encryption performance requirements and WAN topology, the Cisco portfolio of "VPN-optimized" routers may be a better alternative. VPN-optimized routers offer optional hardware extensibility for enhanced security performance. VPNs can also be implemented using the PIX Firewall. Implementing VPN solutions on either portfolio of VPN routers or the PIX Firewall enables robust VPN deployment using existing

Cisco networking gear, thus preserving enterprise investments in networking infrastructures.

2.4 Technology Used in Implementation Virtual Private Network

- (1) Hardware VPNs: Using router
- (2) Software VPNs: Using Proxy, firewall or radius
- (3) Mixed technology: Using router and Radius

This VPN which will be implemented using mixed technology. It is the best way of VPN for we can prove that it has a delay time shorter than other technologies.

These below types of VPNs are generically referred to a Layer 2 VPNs. The emerging form of VPNs are networks constructed across shared IP backbones, referred to as 'IP VPNs'. There are fundamentally three different corporate or business uses of VPNs:

- (a) Remote Access VPNs
- (b) Intranet VPNs
- (c) Extranet VPNs

Each kind of VPN has its own challenges, and different ways in which it can be built. The topologies of the different VPNs are also dramatically different. Access VPNs, are classical hub and spoke topologies with all the remotes connecting into one or two central sites. Intranet VPNs range from hub and spoke to being a full mesh. The Extranet VPN topology is least understood topology, and for one corporation appears to be hub and spoke, but when viewed for several corporations will be a partial to full mesh of links. These are all virtual topologies, not real topologies, so the underlying premise is that you have ubiquitous to any communication between endpoints, and then impose the structure required.

E-VPN Applications

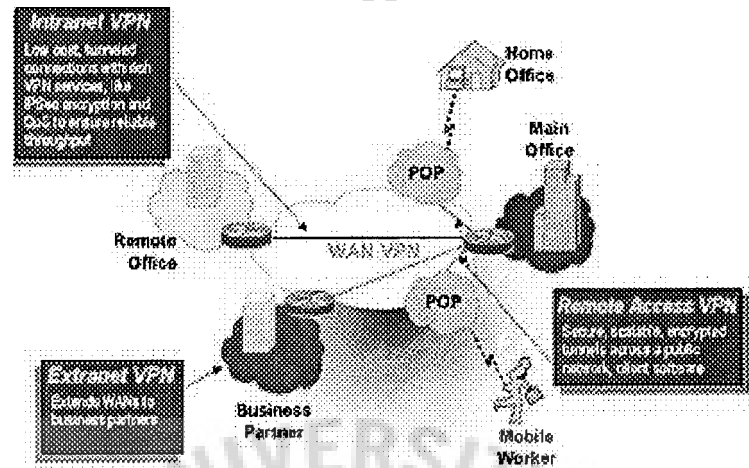


Figure 2.3. E-VPN Applications.

Source: "Byte", September 1998: 58.

(a) Remote Access VPNs

Remote Access VPNs provide remote access to a corporate Intranet or extranet over a shared infrastructure with the same policies as a private network. Access VPNs enable users to access corporate resources whenever, wherever, and however they require. Access VPNs encompass analog, dial, ISDN, digital subscriber line (xDSL), mobile IP, and cable technologies to securely connect mobile users, telecommuters, or branch offices. Access VPNs encompass two architecture options: client-initiated or network access server (NAS)-initiated connections.

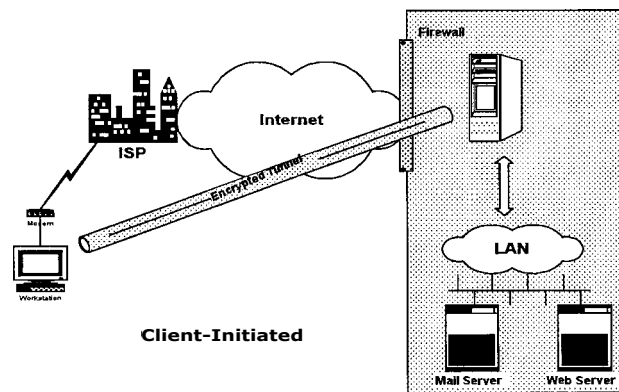


Figure 2.4. Client-Initiated.

- (1) Client-initiated Access VPNs, users establish an encrypted IP tunnel from their client across a service provider's shared network to the corporate network. With this architecture, service providers manage the client software that initiates the tunnel.

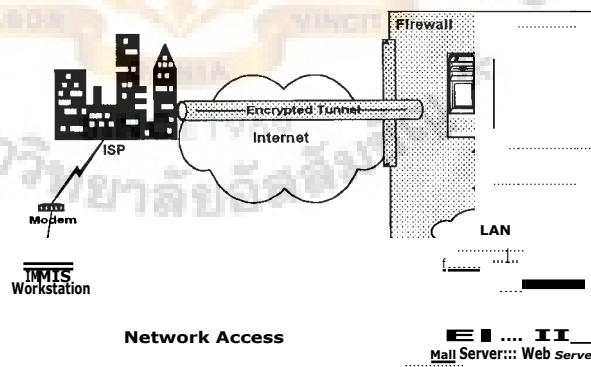


Figure 2.5. Network Access.

- (2) Network access server (NAS)-initiated defines tunnels initiated from the NAS. In this scenario, remote users dial into a service provider's

point of presence (POP) via a local or toll-free number. The service provider, in turn, initiates a secure, encrypted tunnel to the corporate network. With a NAS-initiated architecture, service providers authenticate the user to gain initial access to the corporate network; however, businesses retain control of their own security policy, authenticating users, authorizing access privileges, and tracking user activity on the network.

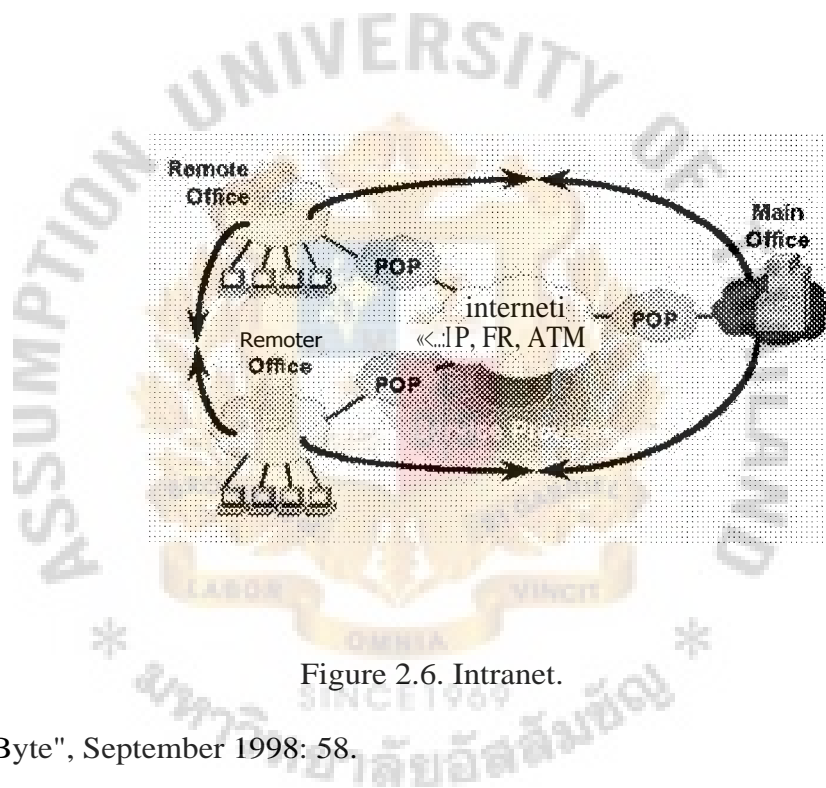


Figure 2.6. Intranet.

Source: "Byte", September 1998: 58.

(b) Intranet VPNs

Intranet VPNs Link corporate headquarters, remote offices, and branch offices over a shared infrastructure using dedicated connections. Businesses enjoy the same policies as a private network, including security, quality of service (QoS), manageability, and reliability.

(c) Extranet VPNs

Extranet VPNs link customers, suppliers, partners, or communities of interest to a corporate Intranet over a shared infrastructure using dedicated connections. Businesses enjoy the same policies as a private network, including security, QoS, manageability, and reliability.

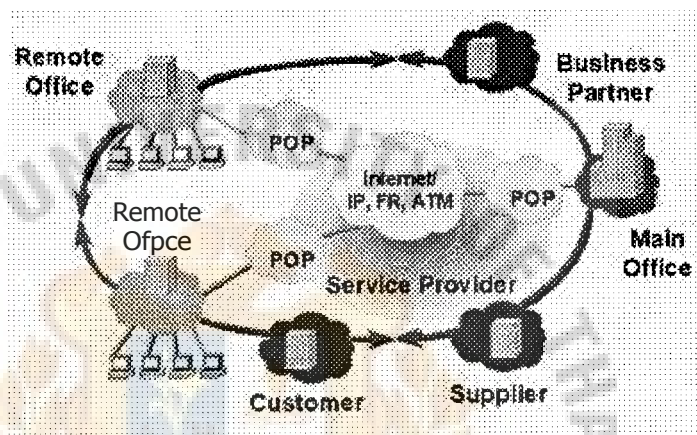


Figure 2.7. Extranet.

Source: "Byte", September 1998: 58.

2.5 Benefit of Implementing VPN

VPNs offer many advantages over traditional, leased-line networks. The primary benefits include:

- (a) Lower cost than private networks. Total cost of ownership is reduced through lower-cost transport bandwidth, backbone equipment, and operations; according to Infonetics, a networking management consulting firm, LAN-to-LAN connectivity costs are typically reduced by 20 to 40 percent over domestic leased-line networks; cost reduction for remote

access is the 60 to 80 percent range. So it helps to reduce the amount of telephony switching capacity consumed.

- (b) Enabling the internet economy through enterprise network agility. VPNs are inherently more flexible and scalable network architectures than classic WANs, thereby enabling enterprise to quickly and cost-effectively extend connectivity, facilitating connection or disconnection of remote office, international locations, telecommuters, roaming mobile users, and external business partners as business requirements demand.
- (c) Reduced management burdens compared to owning and operating a private network infrastructure. Enterprises may outsource some or all of their WAN functions to a service provider, enabling enterprise to focus on core business objectives, instead of managing a WAN or dial-access network.
- (d) Simplify network topologies, thus reducing management burdens. Utilizing an IP backbone eliminates static permanent virtual circuits (PVCs) associated with connection-oriented protocols such as Frame Relay and ATM, thereby creating a fully meshed network topology while actually decreasing network complexity and cost.
- (e) Reliability. Creating a resource as reliable as the telephone.
- (f) Easy to deploy, the proposed system fits into the existing network. It means that there is no need to change any network configuration, only append it into the existing system.

III. ANALYSIS OF THE EXISTING SYSTEM

3.1 Background of the Company

Automobile (Thailand) Ltd., is an automobile importer. All products are imported from the head office from Japan. Therefore, Automobile (Thailand) Ltd. is a representative automobile company which focuses on Thailand's market. Product lines consist of a sedan, a pick up car, a van and spare parts. Our mission is to expand our markets over Thailand in a short time and establish strong and long term business relationships through the quality of product and superior service. Head office in Thailand was established in Bangkok. And there are 15 dealers in upcountry over in Thailand to focus and expand sales in the upcountry.

The list below are the names of 15 upcounties node which dealers were established.

Central region consists of 3 provinces as the following:

- (1) Suphanburi
- (2) Ayudthaya
- (3) Nakornpathom

North region consists of 4 provinces as the following:

- (4) Chiang Mai
- (5) Chiang Rai
- (6) Phitsanulok
- (7) Nakhonsawan

South region consists of 3 provinces as the following:

- (8) Phuket
- (9) Songkhla
- (10) Nakhon Sri Thammarat

Eastern Region consists of 2 provinces as the following:

(11) Chonburi

(12) Rayong

Northeastern region consists of 3 provinces as the following:

(13) Khonkaen

(14) Nakorn Ratchasima

(15) Ubhon Ratchathani

Now all dealers must pay for long distance calls every time they call or fax to the head office. The rate of long distance charge are shown in Appendix C.

We consider that if any Internet Service Provider (ISP) has had nodes match all 15 upcounties of the company, we will apply services with the ISP. This is the criteria to consider to choose ISP. There are four main departments in the company that are controlled by Managing Director as show in the company organization chart in Figure 3.1.

(1) Finance Department

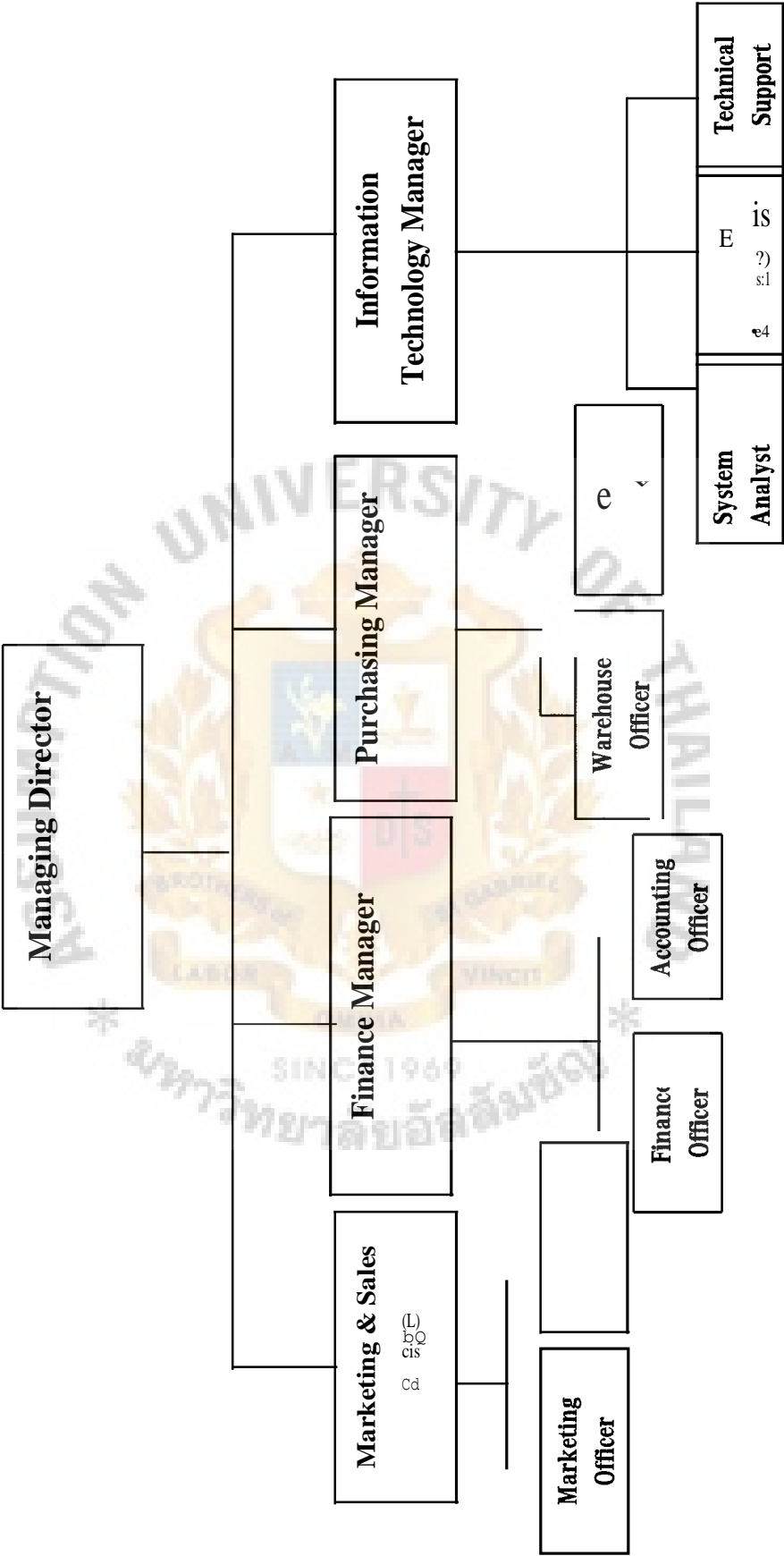
(a) Financial Division

This division controls the company's cash flow and all expenditures, monitoring the company's liquidity in running a business. Moreover, this division also has an objective in doing a fund raising, reserving and utilizing the capital effectively.

(b) Accounting Division

The main duties of this division are recording and clarifying all cash inflow and outflow, including reports showing the financial status.

JANUARY 1, 2000



Organization Chart.

(2) Marketing and Sales Department

(a) Marketing Division

The duties are setting up marketing strategies, planning and controlling all marketing activities to meet the expected marketing strategies. Moreover, the marketing team also have to stimulate sales representatives to implement and follow up the strategies. The good marketing team has to have a good vision in leading the company into the right direction and has more strength than any competitors.

(b) Sales Division

The most earning money comes from this division. The main objective of this division is responsible to achieve the sales target. The sales supervisor is responsible in controlling and managing his/her team to meet the sales target by using marketing strategies. Therefore, the sales team and marketing team have to co-ordinate to each other.

(3) Purchasing Department

(a) Warehouse Division

This division is responsible for inventory control to meet the objective that company can save the inventory cost and maintain the minimum stock level. This division has to co-ordinate with the purchasing e division to report whenever the inventory level reaches the order point, so that the purchasing e division can import the required product from the head office in Japan on time. The only duty of this division is showing the inventory report to Managing Director.

(b) Purchasing Division

This division is responsible to contact directly with the head office in Japan. Whenever this division gets the customer's demand report from the warehouse division to ask for this division order product from head office in Japan, this division has to contact directly to Japan. This will help the company decrease a shortage of supplies and make customer satisfaction when we can deliver the product on time. The division deals with issues in purchasing orders, handling problems with the head office in Japan and maintain appropriate records.

(4) Information Technology Department

(a) System Development Division

(1) System Analyst

Each new system must be analyzed, designed, tested, installed, maintained and evaluated periodically by this division.

(2) System Programmer

Its function or responsibility is the maintenance of the software, such as the operating system, data-base management, and so on.

(b) Operation Division

This division deals with processing support for job requiring various resources of data processing equipment. This is done by operating the computer system, mounting tapes and disks, and performing program-directed operation. Moreover, it deals with production support which is responsible for all performance

measurement and evaluation, maintenance of supplier and security implementation of the central site.

(c) Technical Support Division

Its function provides technical support to the data processing activities as well as to the users

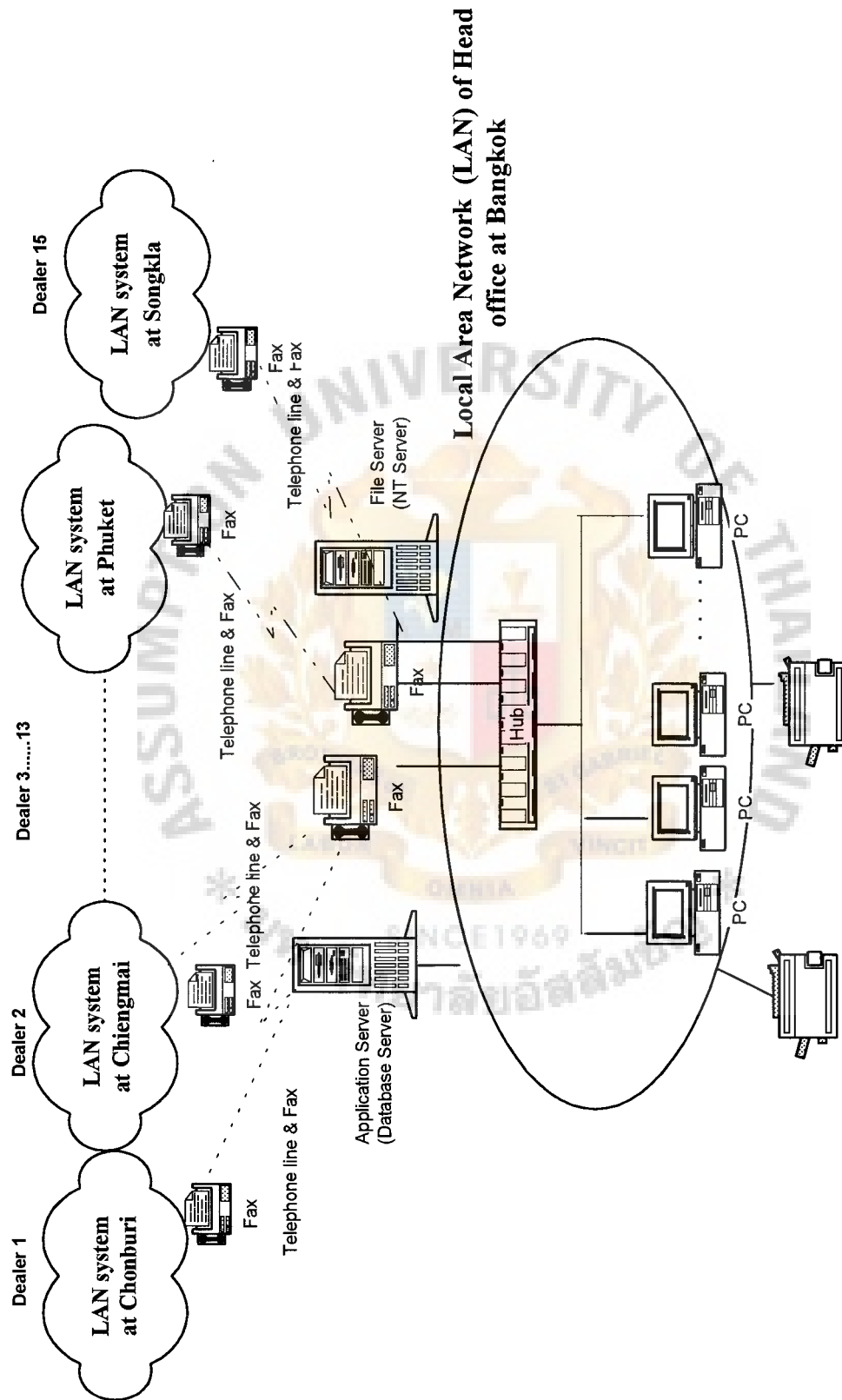
The main departments are:

- (1) Financial Department has 2 PCs
- (2) Marketing and Sales Department has 4 PCs
- (3) Purchasing Department has 2 PCs
- (4) Information Technology Department has 2 computer servers and 4 PCs

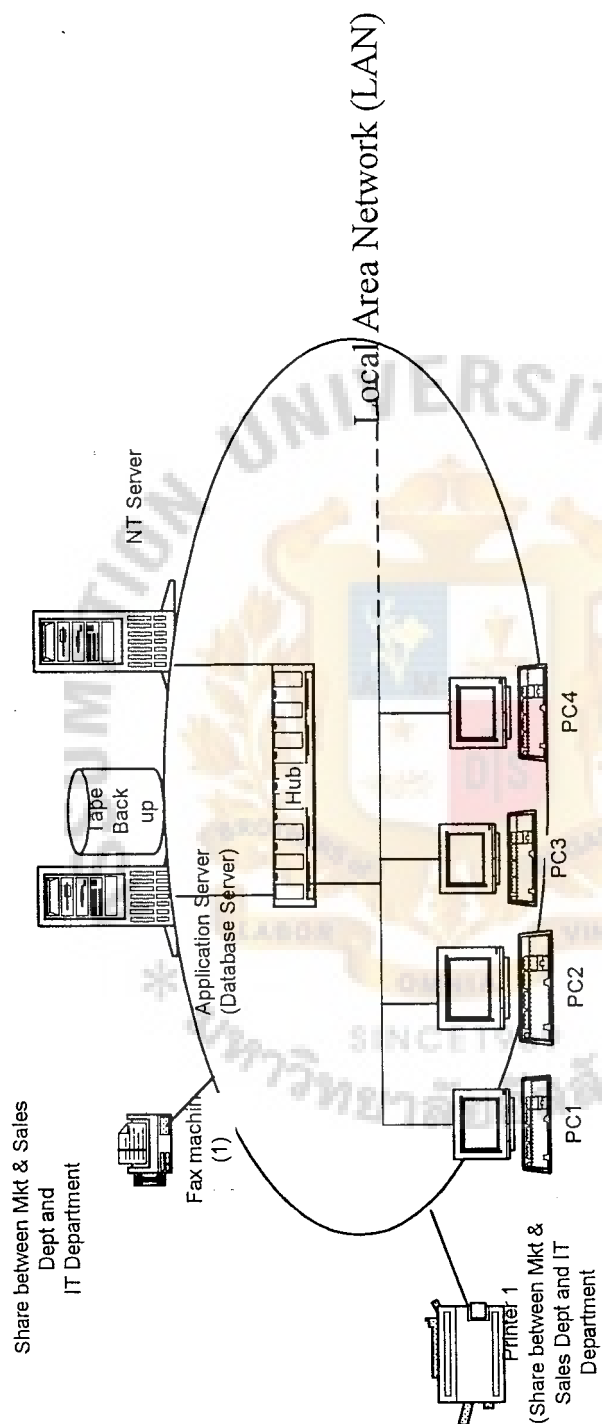
There are 2 printers and 2 fax machines shared by LAN, the first one of printer and fax machine are shared by the Finance Department and Purchasing Department and the second one of printer and fax machine are shared by the Marketing and Sales Department and the Information Technology Department. The existing network of Automobile (Thailand) Ltd. is shown in Figures 3.2-3.6.

For each dealer system, there are 4 main departments; Financial Department, Marketing and Sales Department, Purchasing Department and Computer Department. And there are 1 main server and 4-5 personnel computer used to keep transaction records and printing reports, and one printer, one fax. The existing system of each dealer is shown in Figure 3.7.

Head office absorbs all communication cost of the 15 dealers every month i.e. long distance call, fax, including hardware and software for communication.



The Existing Network of Automobile (Thailand) Ltd.



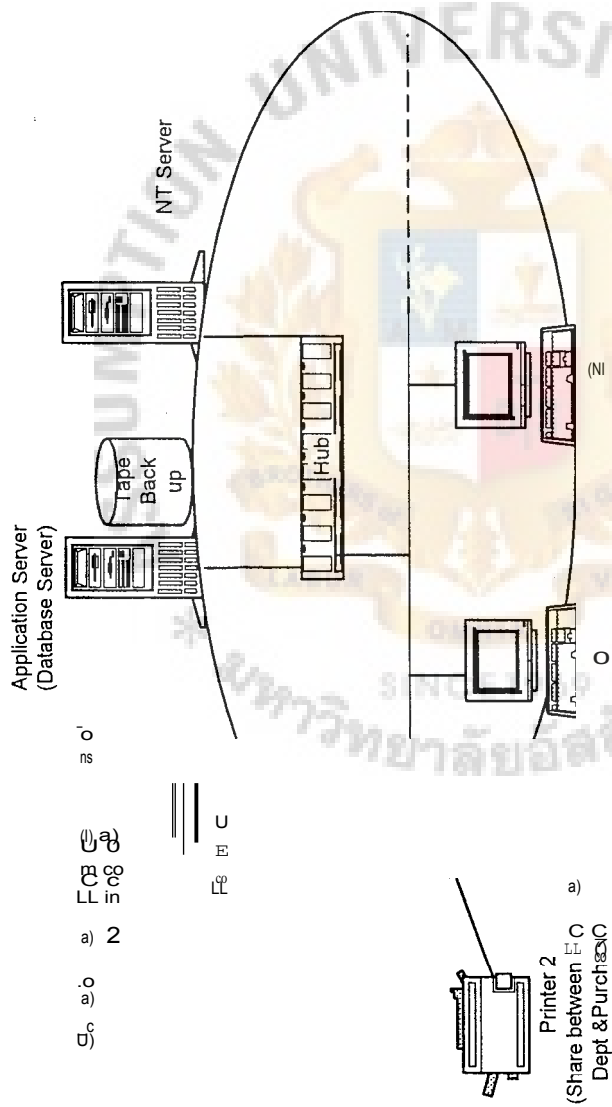
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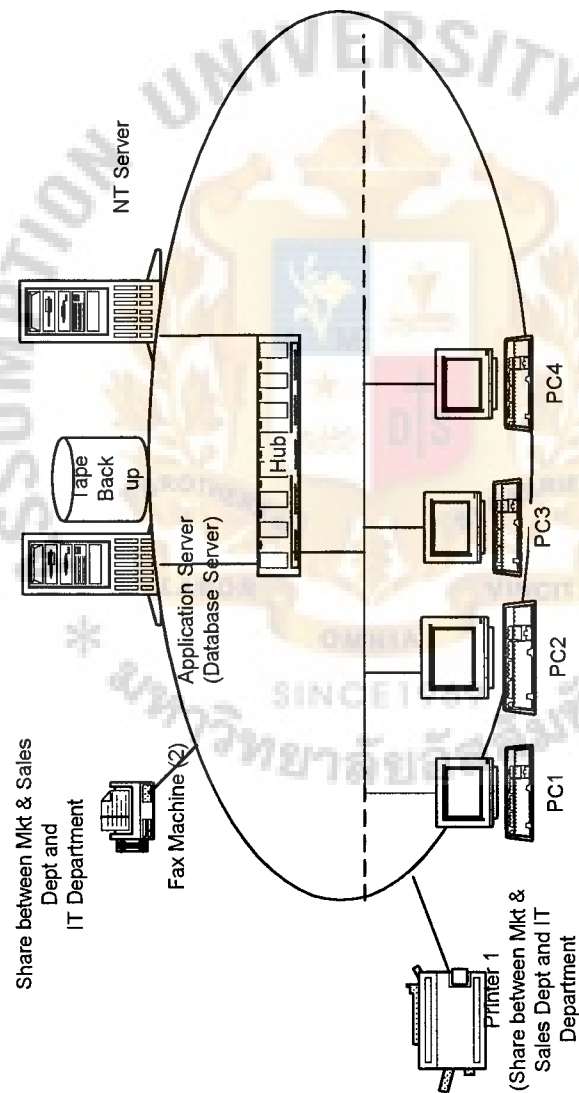
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Local Area Network (LAN)

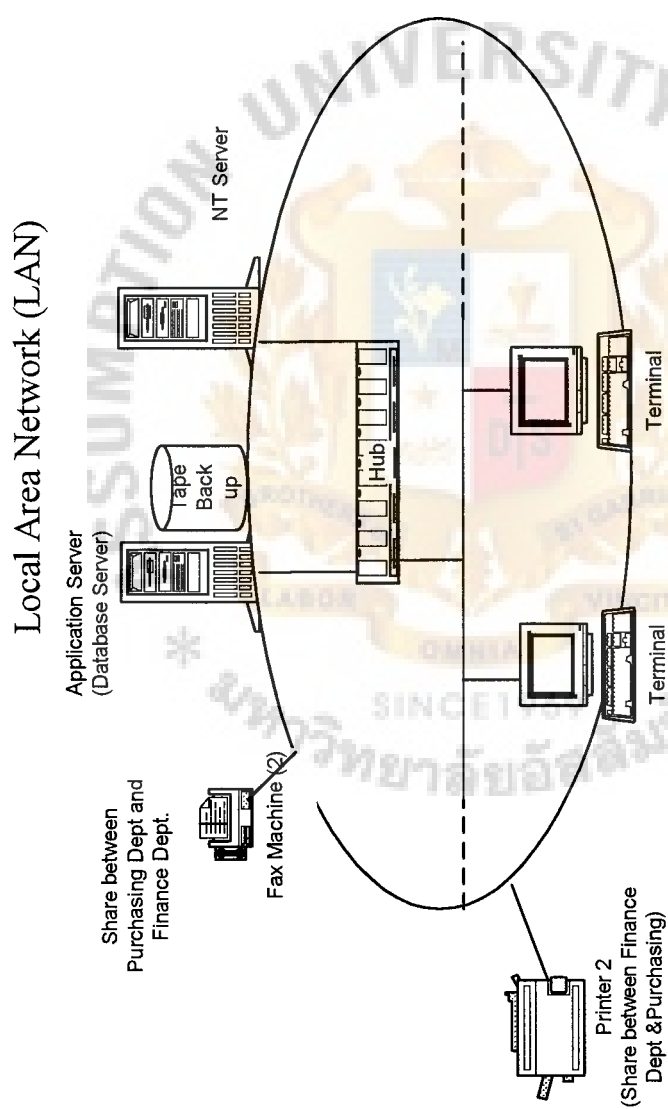


An Existing System of Finance Department Configuration.

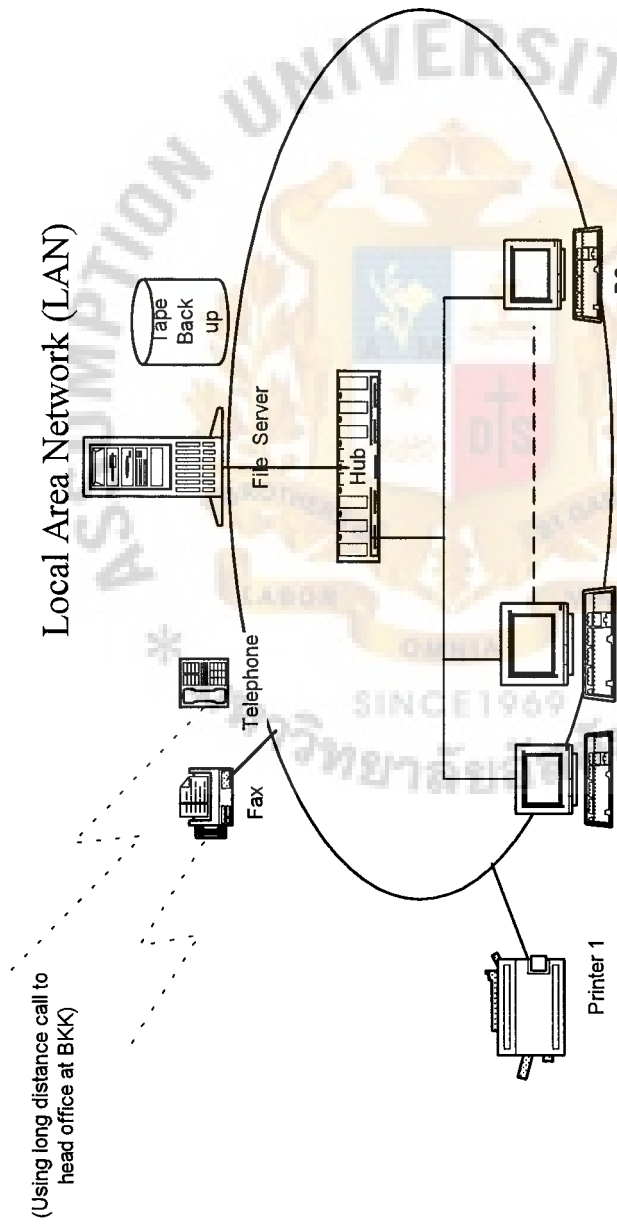
Local Area Network (LAN)



An Existing System of Information Technology Department Configuration.



An Existing System of Purchasing Department Configuration.



Local Area Network (LAN)

๒) An Existing System of Each Dealer (Upcountry).

3.2 Summary of the Existing Network

Both the Head office in Bangkok and its dealers in the 15 upcounties have set up LAN system to share information within organization. However, connection between head office and county's dealers still has problems as follows:

- (1) When its dealers want to update transaction records at that time, for example, they want to update transaction, they must send it by via fax and they will not know whether purchase orders will be sent to the contacted person at the right time, so they have to call to that contact person again to reconfirm whether their document was received absolutely. Therefore, that dealer must spend more in long distance calls and still have the duplication of work.
- (2) When its dealer want to know how many products they can supply, they have to check it by calling to the head office at Bangkok and ask for Inventory division, so these method also makes long distance calls more expensive and takes a long time.
- (3) Every transaction will be saved to diskette and will be sent to head office every end of the week to update transaction happened again.

Every month, its dealers must spend at least 50,000 bahts to 150,000 bahts for long distance charges. You will see that the current method to update information make either of cost or taking long time. They can't get the accurate information at the right time while they have a great cost of long distance charge.

How company can fix this problem?

3.3 Area Under Study

The process of the existing system starts when the customers send the purchase orders to the company, ask for credit pick released products, delivery goods, collect the money or cheque. The dealers will send it to the head office again. This process will be finished when the customers have paid for their invoice. There are many steps to describe the existing procedure.

(a) Process 1: Request for Pricing and Receive Purchase Order

This process related to communication between Marketing and Sales Department, Purchasing Department at the head office in Bangkok and its dealers in the upcountry. It will happen when each dealer needs to check the requirement for its customers such as pricing, stock available, credit status, terms of payment, delivery date and shipping instructions etc.

(b) Process 2: Approve Purchase Order

This process related to Finance Department. By the way, it needs to check credit status, terms of payment, overdue payment and approve this request by Managing Director.

(c) Process 3: Pick Released and Delivery the Product

This process related to Purchasing Department and Finance Department. The products have to pick released and delivery to the customer as well as invoice.

(d) Process 4: Get the Payment

This process related to Finance Department. It has to clear invoices and bill the customers for the payment in cash or in cheques.

3.4 Problems Definition in Existing Network

All problem which our company are facing are shown as the following:

- (a) Having much cost for long distance calls and faxes whenever upcountry dealers want to communicate to the head office in Bangkok. The head office absorbs this communication charges from all dealers every month.

- (b) Time consuming.

Both has to take a long time to update and find required information.

- (c) Use more paper for collecting the document

Because they have to keep information in the hard copy format before save it into diskette. So they need to use paper every time.

- (d) Having duplicated work and working process is slow.

When the dealer sends any documents such as purchase orders to the head office by fax, they must call to the head office again to check whether documents have been received. Or when they want to sent or request any information, they have to wait head office send back every time.

- (e) The data is not accurate.

Since all information of dealers will be saved in the diskette and sent to the head office every end of the week. So data will be updated only one time per week.

- (f) All reports are made slowly so the management also receive the summary report at a later time.

- (g) Cost of product increases because of the long distance cost

By this way, we can reduced the area for improvement as the following:

- (a) To reduce the long distance cost

Because this new solution allow dealer access through the infrastructure of an Internet Service Provider (ISP) which this ISP has a local node at those 15 provinces. So dealers can access information whenever they required. It makes dealers save a great of the long distance calls.

- (b) Time consumption are reduce.

Because of this online information, we can save the time to update information between the head office and its dealers. The existing system allow dealers to update information to the head office only one time a week, and then they have to update information internally after working hour every day. Therefore, staff has to work more than 8 hours per day.

- (c) To set up the efficient connection between the head office in Bangkok and its dealers in the upcountry.

Dealers and head office can get the accurate information at the right time, so it can make connection between the head office and its dealers more stable and more reliable and efficient. This is the appropriate method to record, to store, to retrieve the database and product information between the head office and dealers such as price list, product information online, brochure and Catalogue. The information can always real-time online.

- (d) Enhance the Data Integrity

This new network helps each dealer to reduce unnecessary jobs. Each dealers can record the data in the computer center and can share the database and information. The companies can have the data integrity to

serve customer. It helps companies decrease human errors and increases customer satisfaction.

(e) Reduce Data and Document Redundancy

Because we can update data with online system at the right time, there is no need to update and check it again at every end of day or at the end of the week. So we can assure that we can get rid of data and document redundancy absolutely.

(f) To reduce a shortage of stocks

Because we have the inquiry system which all dealers can check before getting the order from customers. Moreover, this system can help the company order products before it runs out of stock.

(g) To increase customer satisfaction and to enhance more chances to compete with competitors

Because we can take feedback to the customer at the right time with the accurate information, so it makes customer satisfaction. This is a competitive advantage increasing market share in Thailand.

IV. DESIGN OF THE PROPOSED NETWORK

4.1 User Requirements

Proposed network is required to solved the problems of the existing network which are previously mentioned. The following are requirements of the user.

- (a) To save cost on long distance calls
- (b) To save time to retrieve information and update transaction records
- (c) To increase the efficiency of work and accurate information
- (d) To decrease the duplication of work
- (e) To do the summary report on time and at any time of user's needs
- (f) To enhance security on this connection by allowing only authorized person to access information and protect outsider tap valuable information while information is sending to users
- (g) To enhance knowledge involved computer technology to staff, make them more efficient

4.2 Information Requirements

The following are the requirements of the proposed network in terms of Virtual Private Network (VPN) which consists of the following items.

- (a) Local Area Network (LANs)

The star network consists of a host computer connected to a number of terminals. This topology is useful for applications where some processing must be centralized and some can be performed locally. One problem with the star network is its vulnerability. All communication between points in the network must pass through the central computer. Because the central computer is the traffic controller for the other computers and terminals in

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the network, communication in the network will come to a standstill if the host computer stops functioning.

(b) Radius Server

Radius server or authentication server is a server which determines whether someone or something is, in fact, who or what it is declared to be. In private and public computer networks (including the Internet), authentication is commonly done through the use of logon passwords. Knowledge of the password is assumed to guarantee that the user is authentic. Each user registers initially (or is registered by someone else), using an assigned or self-declared password. On each subsequent use, the user must know and use the previously declared password. The weakness in this system for transactions are significant (such as the exchange of money) is that passwords can often be stolen, accidentally revealed, or forgotten.

(c) File Server

The file server acts as a librarian, storing various programs and data files for network users. The server determines who gets access to what and in what sequence. Servers may be powerful microcomputers with larger hard disk capacity, workstation, minicomputer, or mainframes, although specialized computers are now available for this purpose. The server typically contains the LAN's network operating system, which manages the server and routes and manages communications on the network.

(d) Router

A router is a device or, in some cases, software in a computer, that determines the next network point to which a package should be forwarded towards its destination. The router is connected to at least two networks and

decides which way to send each information packet based on its current understanding of the state of the networks it is connected to. A router is located at any juncture of networks or gateway, including each Internet point-of-presence. A router is often included as part of a network switch. A router creates or maintains a table of the available routes.

Software on Router maintains VPN protocol is Layer 2 Tunneling Protocol (L2TP) or Layer 2 Forwarding Protocol (L2F). Its function is encapsulation package or data while it is sending to its destination. For more information about L2TP and L2F, please see at APPENDIX B.

(e) Gateway

A gateway is a network point that acts as an entrance to another network. On the Internet, in terms of routing, the network consists of gateway nodes and host nodes. The computers of network users and the computers that serve content (such as Web pages) are host nodes. The computers that control traffic within your company's network or at your local Internet service provider (ISP) are gateway nodes.

In the network for Virtual Private Network (VPN), a computer server acting as a gateway node is often also acting as a proxy server and a firewall server. Gateways also involve the use of router and switches.

(f) Mail Server

Mail Server is a high-end computer with Mail Server Software installed. Mail Server serve as an electronic post office for both internal and external communications. Users can send and receive electronic mails (e-mails) to and from other users inside company, and other organizations on the Internet; both domestically and in overseas. All of users both local on

LAN and remote will have their e-mail addresses as usernames@company.co.th, Mail server help to increase the efficiency of communication.

(g) Application Server

An application server is a server program in a computer in a distributed network that provides the business logic for an application program. The application server is frequently viewed as part of a three-tier application consisting of a graphical user interface (GUI) server, an application (business logic) server, and a database and transaction server. More descriptively, it can be viewed as dividing an application into:

- (1) A first-tier, front-end, Web browser-based graphical user interface, usually at a personal computer or workstation
- (2) A middle-tier business logic application or set of applications, possibly on a local area network or Intranet server
- (3) A third-tier, back-end, database and transaction server, sometimes on a mainframe or large server

For this proposed system, we will concentrate only for the choice no.(2), (3)

(h) Leased line connection

A leased line is a telephone line that has been leased for private use. In some contexts, it's called a dedicated line. A leased line is usually contrasted with a switched line or dial-up line.

Typically, large companies rent leased lines from the media provider such as Telecom Asia (TA), United Information Highway (UIH) etc. to interconnect different geographic locations in their company. The alternative is to buy and maintain their own private lines or, increasingly

perhaps, to use the public switched lines with secure message protocols.

(This is called tunneling.)

4.3 System Design and Data Flow Diagram

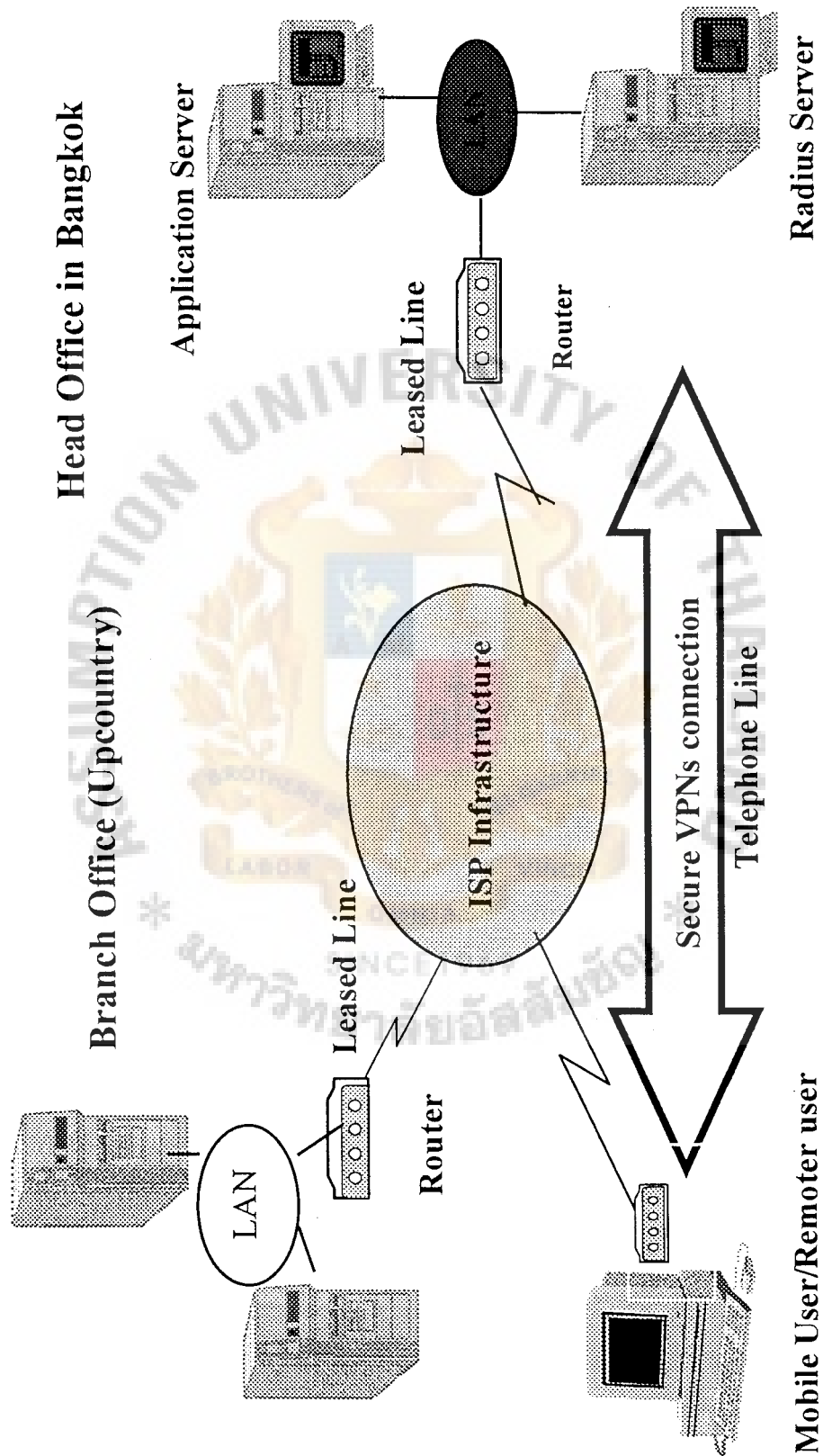
(a) System Design

The goal of a virtual dialup service is to allow many separate and autonomous protocol domains to share a common access infrastructure including modems, access servers. By providing virtual dialup solutions, service providers can offer a full range of services closer to the remote user. Local calls can now be placed to gain access to the core infrastructures. Virtual dialup services not only attract more users of this service, but because calls are terminated locally, they also reduce the amount of telephony switching capacity consumed.

This proposed system is introduced to help improve working performance of all departments and all connection between head office and dealers and provide efficient and accurate data that enables the company to plan and forecast the sales volume, supply stock.

We will apply VPN service with one ISP named LOXINFO. This ISP offer two methods for VPN implementation, The detail as follows:

- (1) Dial-to-Host or Remote Access VPN or Virtual Private Dial-up Network, called "VPDN"
- (2) Host-to-Host or Intranet or Extranet or Virtual Private Network, "VPN."



The difference between the 2 methods mentioned above was discussed in Chapter II. Moreover, VPN and VPDN use different media. VPN is host-to-host connection using leased line or permanent line connect to Internet Service Provider, "Loxinfo" node at that province, so the cost of leased line will be fixed every month, the minimum service charge is 7,500 bahts per month for 64 kbps. On the other hand, VPDN use normal telephone lines to connect to Loxinfo node at provinces whenever they need. So the cost of telephone lines is not fixed. We can pay only 3 bahts per call since we connect to a local node. Figure 4.1 shows VPN and VPDN Diagram.

From the above details, we can see that company will choose which method is appropriate, the main factor is cost. Since the head office must absorb either communication cost or cost of hardware and software. Therefore, the company will choose any method depending on which method has a lower cost. The following shows the cost comparison between VPN&VPDN

VPN Cost

(1) Initial Cost

(a) Head office

P/C Server 1 unit (@120,000)	120,000 bahts
Router 1 unit (@100,000)	100,000 bahts
MS windows NT 4.0 5 License (@45,000)	45,000 bahts
Setting up VPN system (@50,000)	50,000 bahts
Start-up cost of VPN (@15,000)	15,000 bahts
Security Guarantee of VPN (@20,000)	20,000 bahts
Security Guarantee of Leased line(@22,800)	22,800 bahts

System Administrator Training 1 unit (@30,000)

30,000 bahts

User training 1 unit (@30,000)

30,000 bahts

Document cost (@10,000)

10,000 bahts

Total Initial cost for head office

442,800 bahts

(b) Dealer site (15 sites)

MS Windows NT 5 License 15 units

(@45,000)

675,000 bahts

Router 15 units (@100,000)

1,500,000 bahts

PC Server 15 units (@100,000)

1,500,000 bahts

Installation charge of leased line 15 units

(@10,000)

150,000 bahts

Setting up charge of VPN 15 units(@50,000) 750,000 bahts

Total Initial cost for Dealers

4,575,000 bahts

(2) Operation Cost

(a) Head Office

VPN access charge at 128 bpps 1 unit(@15,000)

15,000 bahts

Leased line at 128 Kbps 1 unit (@11,400

11,400 bahts

Total Operation cost for Head office

26,400 bahts

(b) Dealers site (15 sites)

VPN access charge at 64 kbps.

15 units(@10,000)

150,000 bahts

Leased line connection 64 kbps15 units(@7,500)

112,500 bahts

Total operation cost of dealers per month	262,500	bahts
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VPDN Cost

(1) Initial Cost

(a) Head office

P/C Server 1 unit (@120,000)	120,000	bahts
------------------------------	---------	-------

Router 1 unit (@100,000)	100,000	bahts
--------------------------	---------	-------

MS windows NT 4.0 5 License (@45,000)	45,000	bahts
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Setting up VPN system (@50,000)	50,000	bahts
---------------------------------	--------	-------

Start-up cost of VPN (@15,000)	15,000	bahts
--------------------------------	--------	-------

Security Generate of VPN (@20,000)	20,000	bahts
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Security Guarantee of Leased line(@22,800)	22,800	bahts
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System Administrator Training 1 unit (@30,000)	30,000	bahts
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User training 1 unit (@30,000)	30,000	bahts
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Document cost (@10,000)	10,000	bahts
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Total Initial cost for head office	442,800	bahts
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(b) Dealer site (15 sites)

Modem 56 kbps 15 units (@6,000)	90,000	bahts
---------------------------------	--------	-------

Total Initial cost for Dealers	90,000	bahts
--------------------------------	--------	-------

(2) Operation Cost

(a) Head office

VPN access choose at 128 bbps 1 unit(@15,000)	15,000	bahts
---	--------	-------

Leased line at 128 Kbps 1 unit (@11,400)	11,400	bahts
--	--------	-------

Total Operation cost for Head office per month	26,400	bahts
--	--------	-------

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(b) Dealer site (15 sites)

Assume that we want to connect 8 hours working hours

- (1) 20 working days per month and 3 times per day
- (2) 3 bahts per call (local call due to local node connection)
- (3) VPDN usage time charge by Loxinfo is 20 bahts per hour
- (4) Total 15 site

Telephone cost is

$$= 3 * 20 * 3 * 15$$

$$= 2,700 \text{ bahts/ 15 sites}$$

VPN Usage time charge is

$$= 8 * 20 * 20 * 15$$

$$= 48,000 \text{ bahts/month/15 sites}$$

$$= 2,700 + 48,000$$

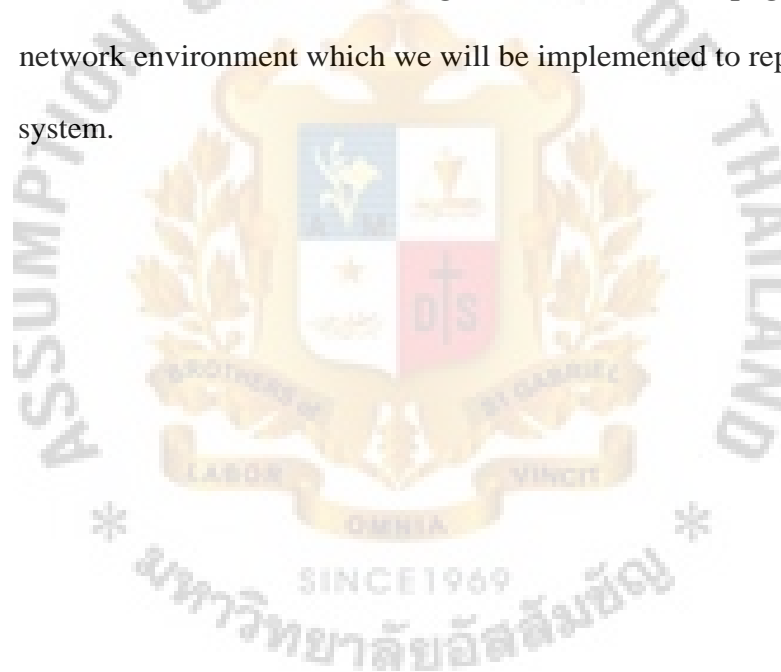
$$= 50,700$$

Total operation cost per month /15 sites is 50,700 bahts

Table 4.1. Comparing Cost between VPN & VPDN.

No.	Description of cost	VPN	VPDN	Difference
1	Initial Cost			
	Head office	442,800	442,800	0
	15 Dealers site	4,575,000	90,000	4,485,000
2	Operation cost per month			
	Head office	26,400	26,400	0
	15 Dealers site	262,500	50,700	211,800
	Total	5,306,700	609,900	4,696,800

After calculating VPN and VPDN cost and making some comparisons between them as seen in Table 4.1. We found that the initial cost of VPN and VPDN for the head office is not so different. But initial cost for dealer is different. The initial cost of dealer site in case of using VPN is higher than VPDN about 4,485,000 bahts. Moreover, the operation cost per month of VPN is higher than VPDN about 211,800 bahts per month or 2,541,600 bahts per year. We summarize that the cost of initial and operation for VPN is higher than VPDN. Therefore, we found that the best way is VPDN because of lower cost. The Figure 4.2 on the next page shows VPDN network environment which we will be implemented to replace the existing system.



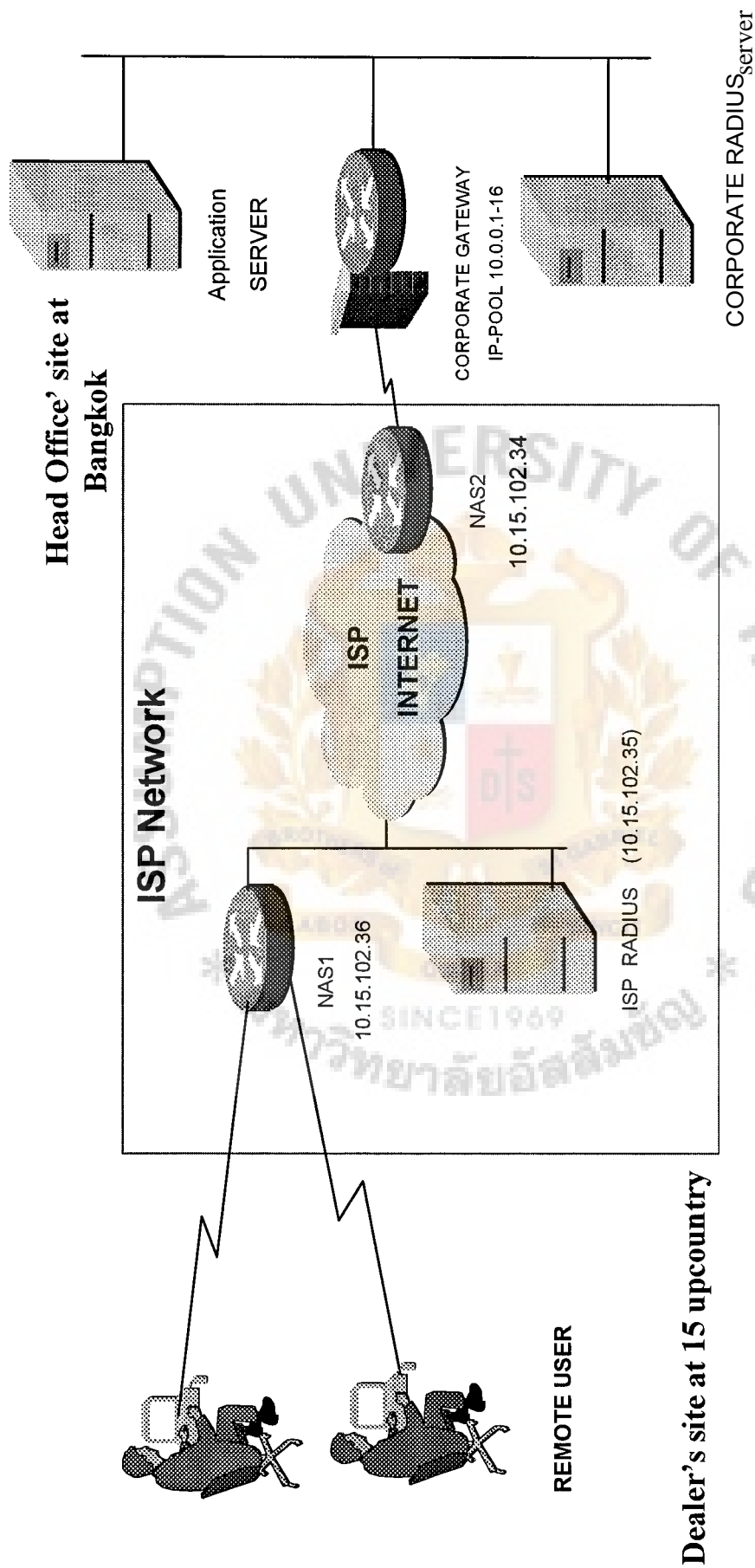


Figure 4.2. Virtual Private Dial-up Network Environment.

Figure 4.3 below illustrates a VPDN connection from a remote user, who makes local calls, to the corporate network, through an end-to-end L2F tunnel (shown by the dotted line). The user can even be sent directly to a restricted part or a restricted set of servers on the corporate based on the user's authentication. In Figure 4.3, the restriction placed on this user is suggested by the arc isolating a part of the corporate network cloud.

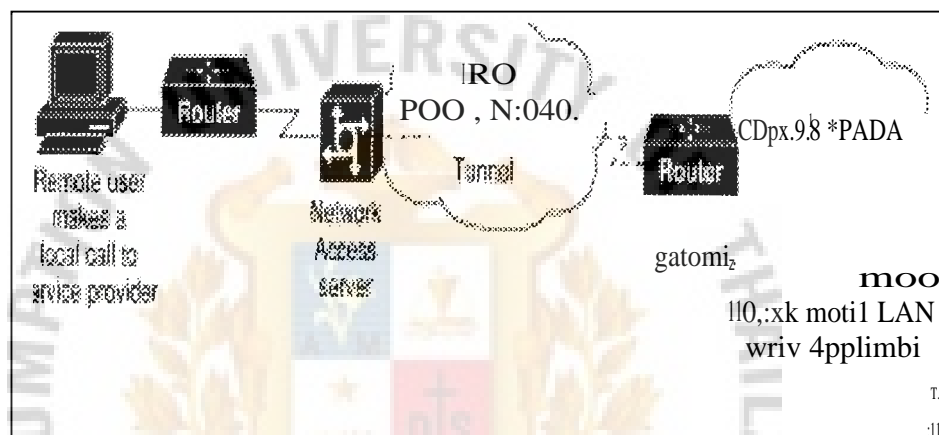


Figure 4.3. Process of VPDN Works.

VPDN connection between a remote user and the home LAN is accomplished in the following steps:

- (1) The remote user initiates a PPP connection to the ISP using the analog telephone system or ISDN.
- (2) The ISP network access server accepts the connection.
- (3) The ISP network access server authenticates the end user with CHAP or PAP. The username is used to determine whether the user is a VPDN client.

If the user is not a VPDN client, the client accesses the Internet or other contacted service.

- (4) The tunnel endpoints--the network access server and the home gateway--authenticate each other before any sessions are attempted within a tunnel.
- (5) If no L2F tunnel exists between the network access server and the remote users' home gateway, a tunnel is created. Once the tunnel exists, an unused slot within the tunnel is allocated.
- (6) The home gateway accepts or rejects the connection. Initial setup can include authentication information required to allow the home gateway to authenticate the user.
- (7) The home gateway sets up a virtual interface. Link-level frames can now pass through this virtual interface through the L2F or L2TP tunnel.

The Figure 4.4 as the next page shows the proposed system, "Virtual Private Network" which is the new network connect between company and its dealers.

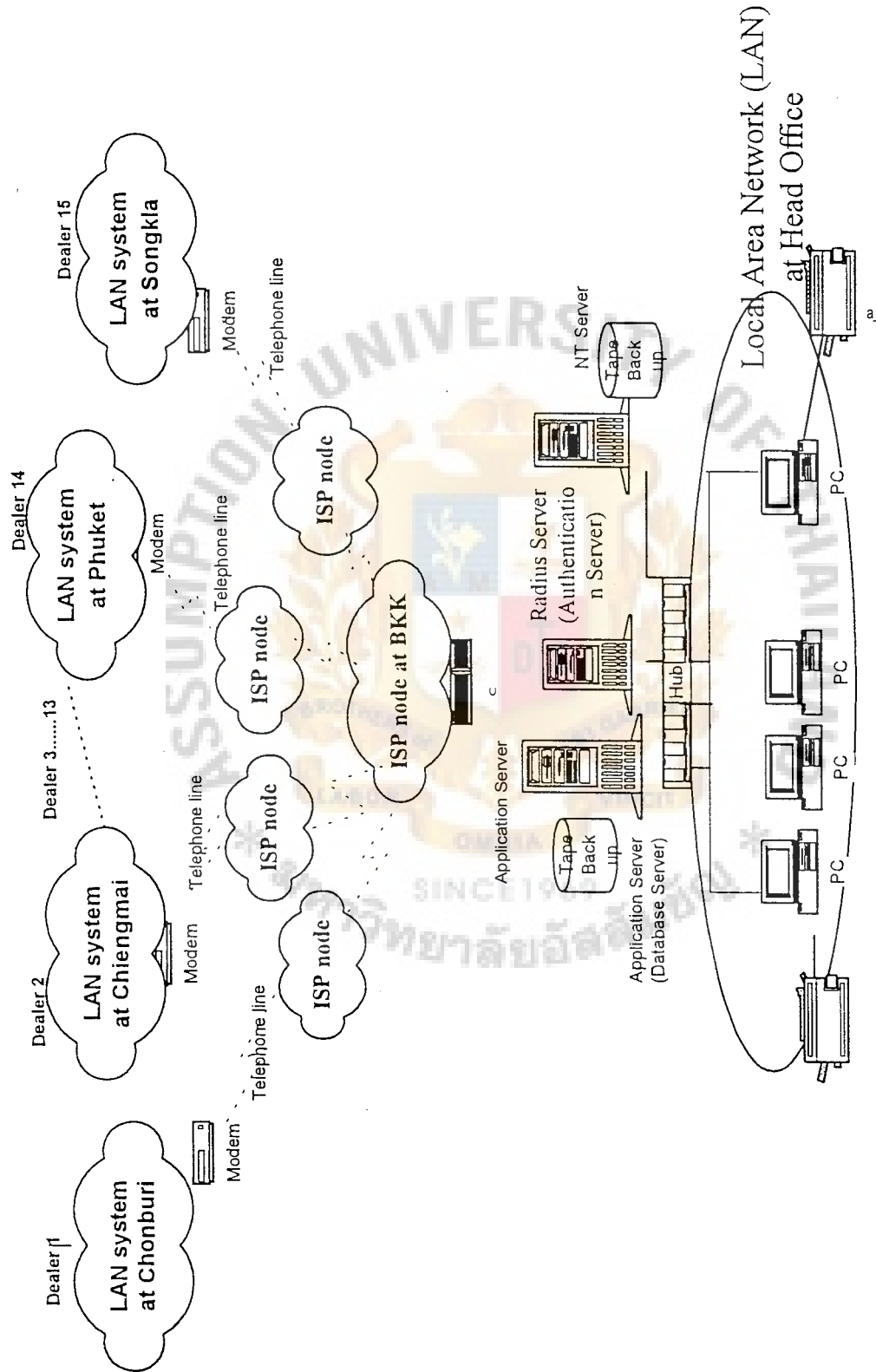


Figure 1

The Proposed Network.

(b) The Data Flow Diagram

After we have gotten the user requirement and designed the new network that can help the company to attain goals. As a result, we have to design the Data Flow Diagram. That will be shown on the Figure 4.6 as the following:

(1) Context Diagram of Proposed System. It is shown in Figure 4.5. It is a

database system which allows dealer site to connect through via VPN to the head office at Bangkok and pick up the required information. This information was prepared by Marketing and Sales department, Finance and Accounting Department, Purchasing Department. It consists of 5 entity i.e. Marketing & Sales department, Finance department, Purchasing department, Managing Director, Dealers at upcountry. In the process of work, dealers will be treated as well as they are end-customers. We will consider the process when they requested the products and service information, send purchase order, get product and take payments to the company. In each entity has a lot of activities:

(a) Marketing Department

They take responsible to give information such as Price list, product catalogue, marketing program, to dealers. They can use VPN serve these requirement to update those information to database server. And all dealers can get required information from this server at any time.

(b) Finance and Accounting Department

They are responsible for request for credit line, type of payment, and check for payment. They can use the server for these requirements same as the marketing department does it. The information which the dealer needs information from this department such as notice credit status, credit line and terms of payment.

(c) Purchasing Department

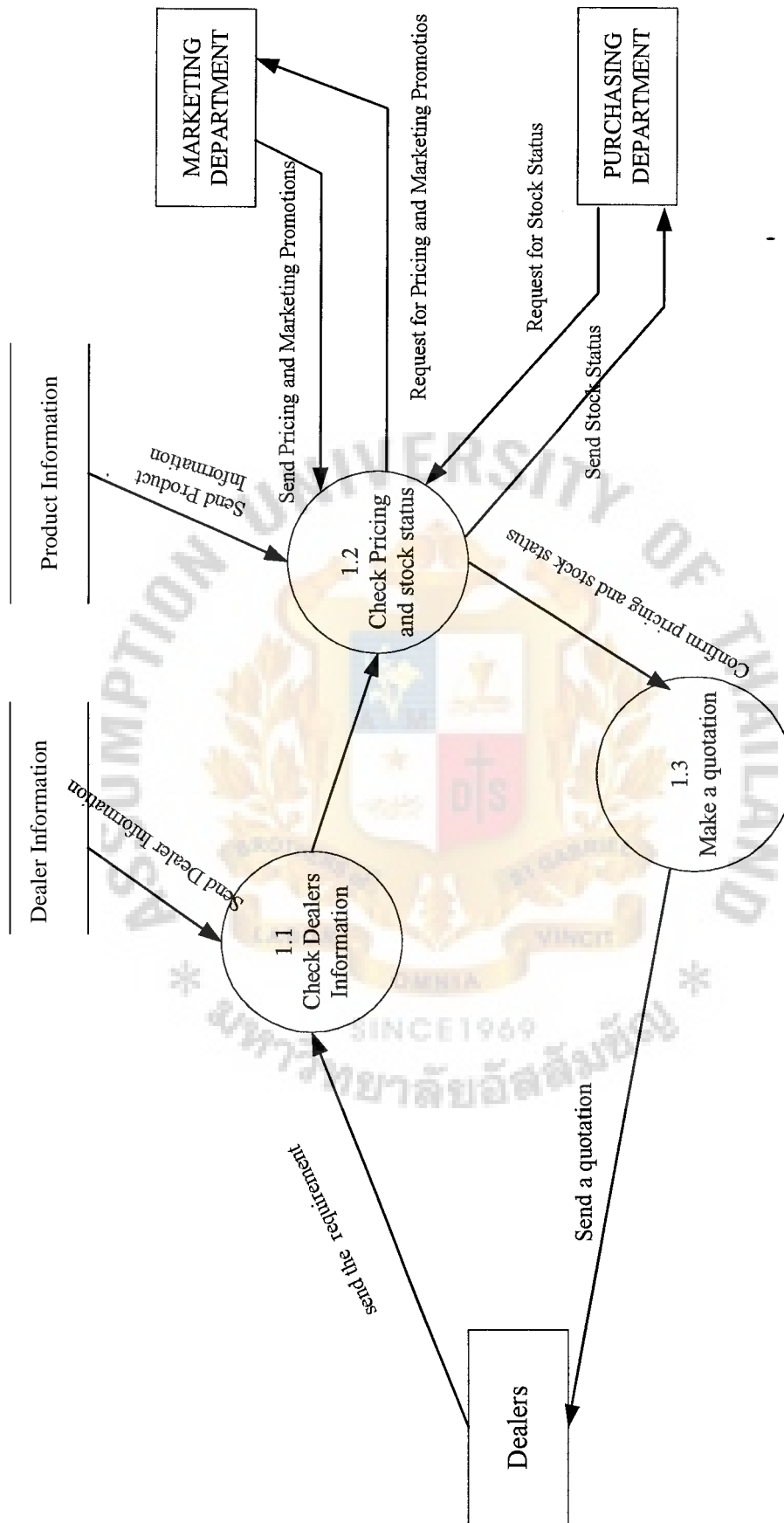
Warehouse division take responsibility for request for stock status, check schedule reservation, notify daily problem etc. They have to server these requirements by updating information at the database server and let the dealer who has authorization get information required from this server. The information dealer requires such information as notify stock status, schedule reservation and daily problem etc.

(d) Managing Director

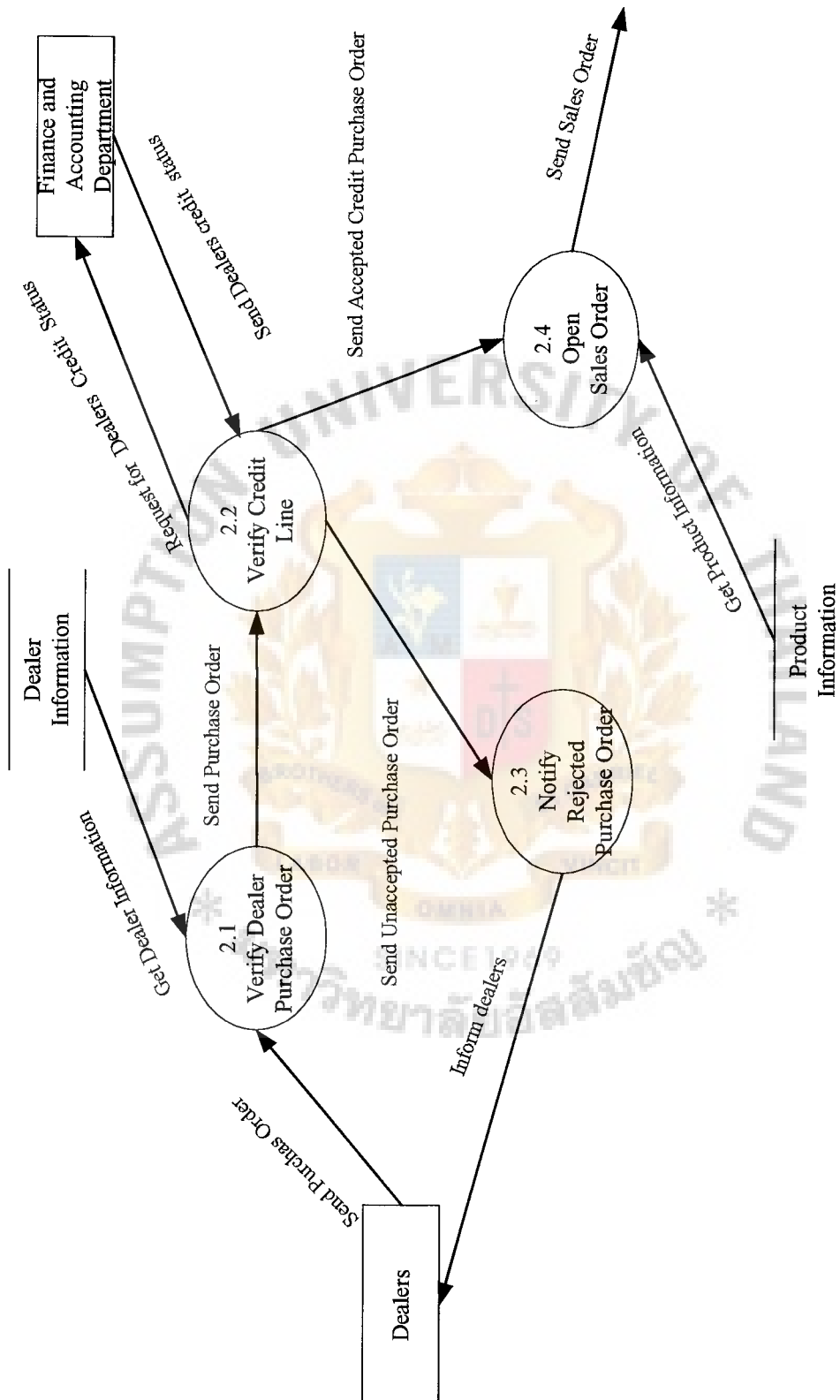
He takes responsibility to approve or not to approve request forms from each department. Moreover, he can view and check the operational reports and management reports.

(e) Dealers at upcountry

After they got the customer confirmation to order any products, they will open purchase order (PO) and also specific terms of payment. And they will sent it to the marketing department of the head office in Bangkok. They can send it whenever the transaction happens through via VPN.



Data Flow Diagram Level 1 of Process 1.



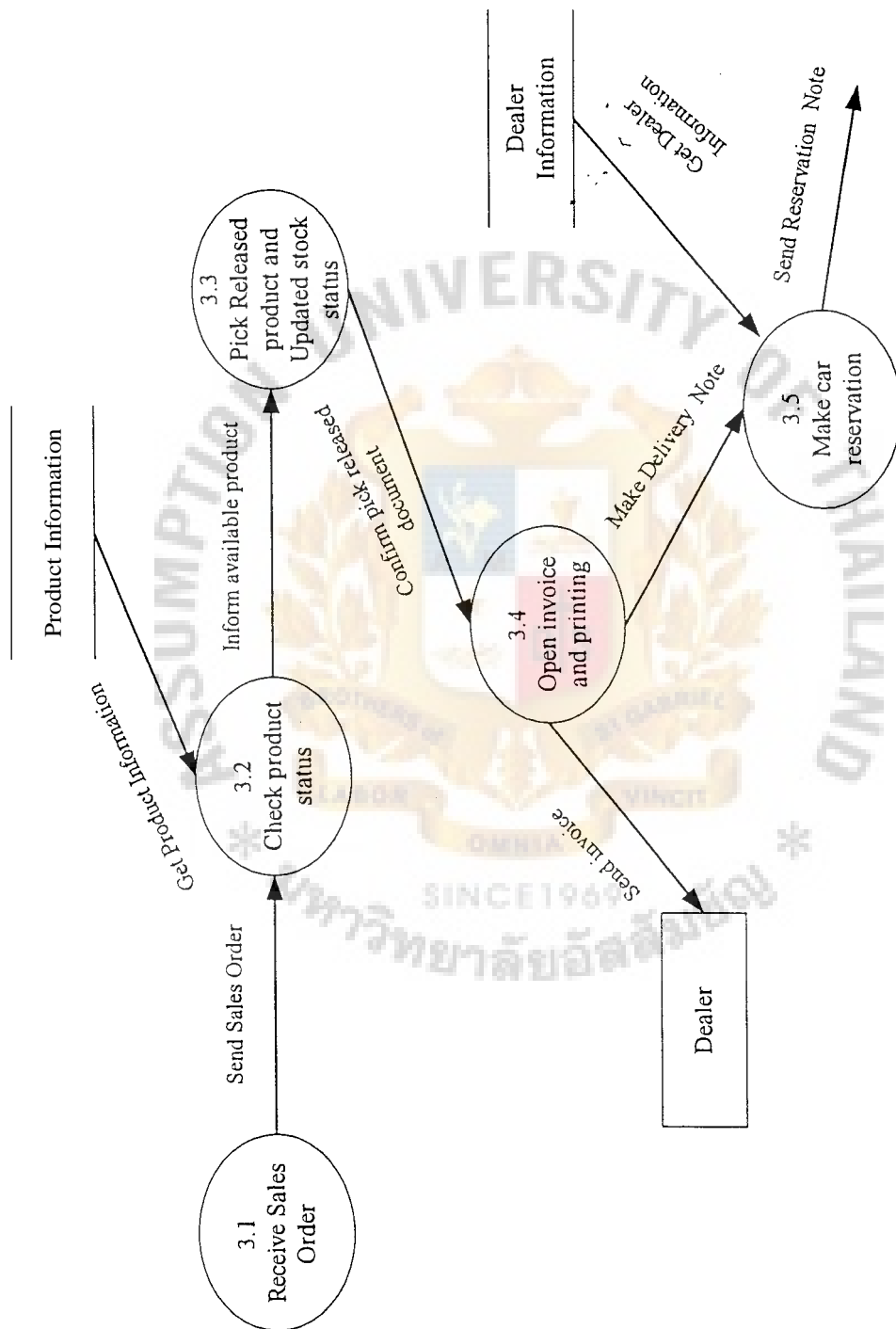


Figure 4.9. Data Flow Diagram Level 3 of Process 3.

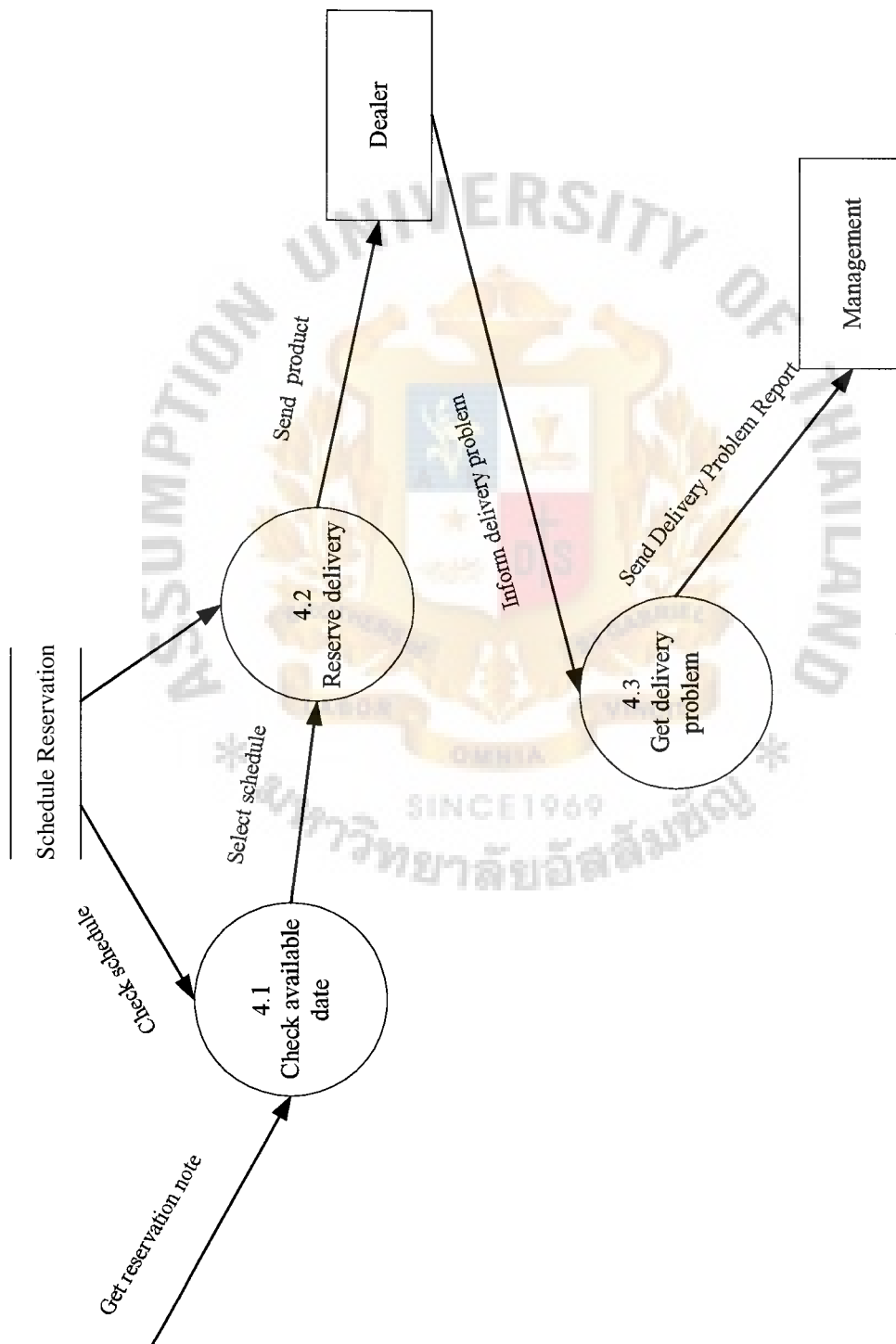


Figure 4.10. Data Flow Diagram Level 1 of Process 4.

(2) Data Flow Diagram Level 0. It is shown in Figure 4.6. It consists of 5 process they are the following:

- (a) The process 1: It concerns with dealers request for pricing and catalogue by linkage to Product Information Database.
- (b) The process 2: It concerns with Verity Dealers Purchase Order and Credit Status by linkage to Dealer Information Database.
- (c) The process 3: It concerns with Pick Released products and Open the invoices.
- (d) The process 4: It concerns with Reserved Delivery that has to be checked from Schedule Reservation.
- (e) The process 5: It concerns with getting the payment.

(3) Data Flow Diagram Level 1 of Process 1. It can show in Figure 4.7. It consists of 3 processes as the following:

- (a) Process 1.1: It is related to check Dealer Information that directly links to the Dealer Information Database.
- (b) Process 1.2: It is related to Check Pricing and Stock Status that directly links to Product Information Database.
- (c) Process 1.3: It is related to make a quotation in order to confirm pricing and stock status.

(4) Data Flow Diagram Level 1 of Process 2. It can show in Figure 4.8. It consists of 4 processes as the following:

- (a) Process 2.1: It is related to verify Dealer Purchase Order by checking from Dealer Information.
- (b) Process 2.2: It is related to verify credit line by request to Finance and Accounting Department.

(c) Process 2.3: It is related to notify Rejected Purchased Order to the customer.

(d) Process 2.4: It is related to open Sales Order. After we got the Accepted Credit Purchase Order, we can open Sales Order.

(5) Data Flow Diagram Level 1 of Process 3. It is shown in Figure 4.9. It consists of 5 process they are the following:

(a) Process 3.1: It is related to receive Sales Order.

(b) Process 3.2: It is related to check product status from Product Information Database.

(c) Process 3.3: It is related to pick released products and updated stock status.

(d) Process 3.4: It is related to open invoices and printing. After we got the pick-released document, we can print the invoices.

(e) Process 3.5: It is related to make a car reservation. This process have to invoices and delivery note in order to make the reservation. It also has to link to Dealer Information Database.

(6) Data Flow Diagram Level 1 of Process 4. It can show in Figure 4.10.

It consists of 3 processes as the following:

(a) Process 4.1: It is related to check available date in Schedule Reservation Database.

(b) Process 4.2: It is related to reserve delivery in order to send products to dealers.

(c) Process 4.3: It is related to notify delivery problems to Managing Director and find out the solutions.

4.4 Hardware and Software Requirement

The objective of this new solution is to provide the new network which helps organizations solve all problems in existing network and meet user's requirement. After implementation, communication between the head office in Bangkok and dealers in 15 upcountries will be smoother and faster.

The cost of product decreased due to long distance call has been taken care of. The price per unit will be reduced which helps companies increase competitive advantage in the automobile market. Moreover, this new network helps companies reduce a short stock, which can enhance customer satisfaction more. By having a Virtual Private Network (VPN), the process of the whole company will become better. The hardware and software requirement is shown in Appendix A.

4.5 Design of Entity Relationship Diagram (ERD)

There are 5 major entities that the system has to maintain their data.

- (a) Product Information, which is identified by Item
- (b) Schedule Reservation, which is identified by reservation number and Dealer number.
- (c) Dealer, which is identified by dealer number and dealer name.
- (d) Purchase Order, which is identified by Purchase Order Number and Customer Number.
- (e) Sales Order, which is identified by sales order and Dealer Number. The

Entity Relationship diagram (ERD) of the proposed system can be drawn as the Figure 4.11.

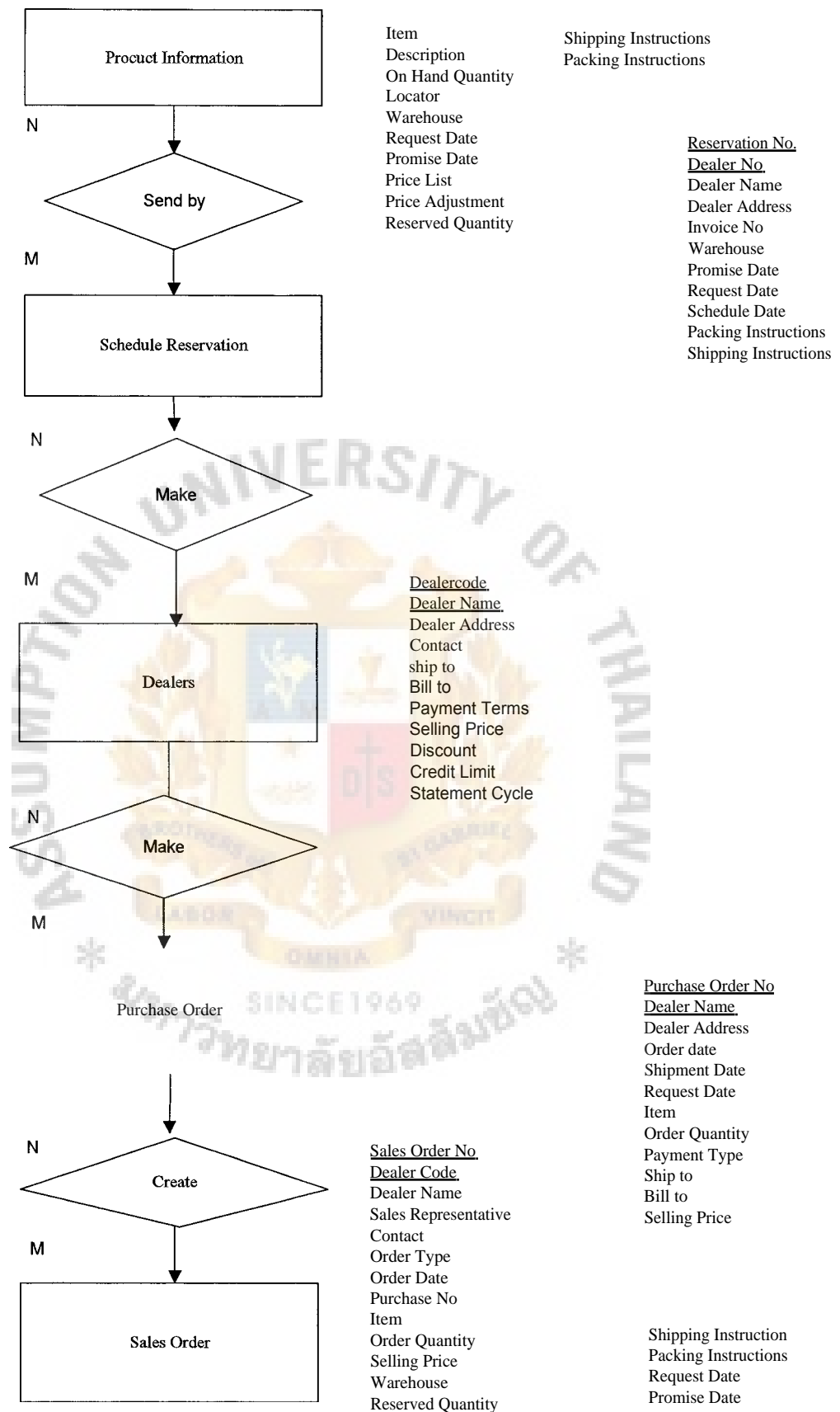


Figure 4.11. Entity Relationship Diagram of Proposed System.

4.6 Cost/Benefit Analysis

(a) Cost Analysis

Cost comparison should be made between the existing system and the new system. A comparison should also be made on the estimated cost of the existing system and the estimated cost of the proposed system.

There are 3 categories of Cost Analysis in calculating the total cost of the proposed system, the categories are shown as the following:

- (1) The Investment Cost
- (2) The Implementation cost
- (3) The Annual Operation Cost

And the detail of each can be discussed as the following:

The Investment Cost

- | | | |
|--|---|---------------|
| (1) PC Server (Radius Server) | 1 | Set |
| (a) IBM Netfinity 1000 Pentium III 500 MHz | | |
| (b) 128 MB ECC SD RAM/MAX 768MB/2 sockets Available | | |
| (c) open Bay, Wide Ultra SCSI Disk ctrl., CD-ROM 32X IDE | | |
| (d) Accelerated Graphics Port (AGP) with 4MB SGRAM | | |
| (e) Ethernet-integrated 10/100 Mbps. | | |
| (f) 1.44MB Diskette Drive, IBM 104Key&Mouse | | |
| (g) 6 Bay (Available 3), 6 Slots (Available 2PCI/IISA) | | |
| (h) HDD 9.1 GB Wide Ultra SCSI 7200 rpm | | |
| (i) G2 Black Monitor (13.2 Viewable) | | |
| @ 120,000 *1 | = | 120,000 bahts |
| (2) Router 1 set (@ 100,000) | = | 100,000 bahts |
| (3) Modem 56 Kbps. 15 sets (@6,000) | = | 90,000 bahts |

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(4)	MS Windows NT ver 4.0 Full Pack with 5 License	1	Set
	@45,000 * 1	=	45,000 bahts
(5)	Installation cost of Software	=	30,000 bahts
(6)	Installation cost of Hardware	=	20,000 bahts
(7)	Installation cost of leased line service at 128 Kbps.	1	unit
	@10,000 *1	=	10,000 bahts
	Total hardware cost	=	340,000 bahts
	Total software cost	=	75,000 bahts
	Total Investment cost	=	415,000 bahts

Implementation Cost

(1)	Setting up VPN System	=	50,000 bahts
(2)	Start-up cost of VPN	=	15,000 bahts
(3)	Security Guarantee of VPN	=	20,000 bahts
(4)	Security Guarantee of leased line	=	28,000 bahts
(5)	System Administrator Training	=	30,000 bahts
(6)	User Training Course	=	30,000 bahts
(7)	Documentation Cost	=	10,000 bahts
	Total Implementation cost	=	183,000 bahts

Annual Operation Cost

The annual operation cost means monthly fee of VPN, usage time per month, salary of employee, office supplies, utility expense and miscellaneous. The operation cost is variable cost which occurs continuously until this system has already been changed.

- (1) Communication cost will increase by 10% per year.
- (2) Advertising cost will increase by 10% per year.

- (3) Salary of employees will increase by 10% per year.
- (4) Space rental will increase by 10% per year.
- (5) Office supplies will increase by 10% per year.
- (6) Utility expense will increase by 10% per year
- (7) Miscellaneous will increase by 10% per year.

Communication cost comes from cost that happens when dealers call or fax to the head office in each day. The difference between the annual operation cost of an existing network is shown in Table 4.2 and annual cost of proposed network are shown in Table 4.3.

- (1) Annual Operation Cost of an Existing network can be shown as the result as follows:

(a)	Year 1	=	14,398,000	bahts
(b)	Year 2	=	15,837,800	bahts
(c)	Year 3	=	17,421,580	bahts
(d)	Year 4	=	19,163,738	bahts
(e)	Year 5	=	21,080,112	bahts

Total annual operation cost of an existing network is 87,901,230 bahts.

I ၁၂ Annual Operation Cost of an Existing Network.

	Communication	ငွေ	Advertising	Space Rental	Office Supplies	Utility	စုစုပေါင်း	Total
Year 1	၂,၆၀၀,၀၀၀	S, ၆80,000	S,000,000	8၇၀,၀၀၀	၀,၀၀၀	၂10,000	၂,၆၀၀,၀၀၀	၇,၄၆၀,၀၀၀
Year 2	၃,၀၀၀,၀၀၀	6,138,000	S,800,000	၉၂၇,၀၀၀	၀,၀၀၀	၇၇၀,၀၀၀	၃,၀၀၀,၀၀၀	ISM၆7,800
Year 3	၃,၆၀၀,၀၀၀	၆,၀၀၀,၀၀၀	၀,၀၀၀	1,016,400	၂၄၀,၀၀၀	၇၀၀,၀၀၀	၃,၆၀၀,၀၀၀	၇,၄၇၁,၆၀၀
Year 4	3,737,448	၇,၀၀၀,၀၀၀	၆၆၆,၀၀၀	1,118,040	၃၄၀,၀၀၀	53,240	၀,၂၀၀	19,163,738
Year 5	၇,၂၂၅,၀၀၀	၀,၀၀၀	၅၂၀,၀၀၀	1,229,844	87,846	၆၀၀,၀၀၀	102,487	21,080,112

Annual Operation Cost of the Proposed Network.

	Communication	ငွေ	Advertising	Space Rental	Office Supplies	Utility	စုစုပေါင်း	Total
Year 1	၂,၆၀၀,၀၀၀	၆,၆၆၆,၀၀၀	၂,၀၀၀,၀၀၀	8၇၀,၀၀၀	၆၀,၀၀၀	၂၀,၀၀၀	၂,၆၀၀,၀၀၀	၂၂,၀၆၆,၀၀၀
Year 2	၂,၂၂၅,၀၀၀	၆,၀၀၀,၀၀၀	၂,950,000	၉၂၇,၀၀၀	၀,၀၀၀	၈၈,၀၀၀	၂,၂၂၅,၀၀၀	၂၃,၁၂၇,၀၀၀
Year 3	1,331,484	၆,၆၆၆,၀၀၀	S,၂115,000	၀,၂၂၅,၀၀၀	၀,၀၀၀	၂၀,၀၀၀	၈၂၀,၀၀၀	14,429,734
Year 4	1,464,632	၇,၀၀၀,၀၀၀	၆,၆၆၆,၀၀၀	1,118,040	၂၄၀,၀၀၀	၂၀,၀၀၀	၆၆၆,၀၀၀	15,872,707
Year 5	၂,၂၂၅,၀၀၀	7,774,371	၂,၆၆၆,၀၀၀	1,229,844	၈၇,၈၄၆	၂,၂၂၅,၀၀၀	102,487	17,459,978

စုစုပေါင်း

(2) Annual Operation Cost of the proposed network can be shown as the following results:

(a)	Year 1	=	11,925,400	bahts
(b)	Year 2	=	13,117,940	bahts
(c)	Year 3	=	14,429,734	bahts
(d)	Year 4	=	15,872,707	bahts
(e)	Year 5	=	17,459,978	bahts

Total annual operation cost of the proposed network is 72,805,760 bahts.

(b) Benefit Analysis

The benefits are divided into tangible and intangible. The proposed network provides several benefits.

(1) The tangible benefits

This method helps to apply in Cost Reduction. There are many things that can be shown as the following:

(a) Reduced of Communication Cost

We plan after this proposed network was established dealers can call to the head office longer than before. Because the rate of long distance call is only 3 baht.

We can calculate the amount of the proposed network as seen below.

Calculate the cost of head office:

- 128 Kbps. Leased line charge per month is 14,000 bahts

- VPN access charge per month is 15,000 bahts

$$= (14,000 * 12) + (15,000 * 12)$$

$$= 348,000 \text{ bahts/year}$$

The local rate is 3 bahts per call

We connect 3 times per day

Working day is 20 day per month

15 Dealer site

Calculate the telephone cost (Dealer' site)

$$= (3 * 3 * 20 * 12 * 15) = 32,400 \text{ bahts}$$

Total cost of telephone is 32,400 bahts/year

- Connect 8 hours per day

VPN usage time is 20 bahts per hour

Calculate the usage time (Dealers' site)

$$= 8 * 20 * 12 * 15 * 20$$

$$= 720,000 \text{ bahts/year}$$

Total cost of VPN access and leased line is 348,000 bahts/year

Calculate total annual cost of communication :

$$= 32,400 + 720,000 + 348,000$$

$$= 1,100,400 \text{ bahts/year}$$

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Year 1 Cost Saving	=	1,707,600	bahts
Year 2 Cost Saving	=	1,878,360	bahts
Year 3 Cost Saving	=	2,066,196	bahts
Year 4 Cost Saving	=	2,272,816	bahts
Year 5 Cost Saving	=	2,500,097	bahts
Total Communication Saving	=	10,425,069	bahts

(b) Reduced of Manpower Cost

Overtime will be decreased both at the head office and dealer site. However, companies will not absorb salary cost for dealers, so we will calculate the reduced overtime at the head office only. Below shows the calculation of the existing overtime expense at the for head office.

Average salary is 10,000 bahts/person

Estimated 9 staffs do overtime

240 working days per year

1.5 times per hour

Average 2 hours overtime per day

12 months

$$(10,000/240 * 2) * 1.5 * 9$$

1,125 bahts/day

Calculate for 240 working days per year

$$1,125 * 240$$

$$= 270,000 \quad \text{bahts/year}$$

Total cost saving per year == 270,000 bahts

Year 1 Cost Saving = 270,000 bahts

Year 2 Cost Saving	=	297,000	bahts
Year 3 Cost Saving	=	326,700	bahts
Year 4 Cost Saving	=	359,370	bahts
Year 5 Cost Saving	=	395,307	bahts
Total Manpower cost saving =		1,648,377	bahts

(c) Reduced of Advertising

Year 1 Cost Saving	=	500,000	bahts
Year 2 Cost Saving	=	550,000	bahts
Year 3 Cost Saving	=	605,000	bahts
Year 4 Cost Saving	=	665,500	bahts
Year 5 Cost Saving	=	732,050	bahts
Total Advertising cost saving =		3,052,550	bahts

(d) Reduced of Office Supplies

Year 1 Cost Saving	=	5,000	bahts
Year 2 Cost Saving	=	5,500	bahts
Year 3 Cost Saving	=	6,050	bahts
Year 4 Cost Saving	=	6,655	bahts
Year 5 Cost Saving	=	7,320	bahts
Total Office Supplies saving =		30,525	bahts

You can see Tables 4.4 — 4.7 which show the annual cost saving.

Table 4.4. Reduced of Communication Cost.

	Old Communication cost	New communication cost	Saving
Year 1	2,808,000	1,100,400	1,707,600
Year 2	3,088,800	1,210,440	1,878,360
Year 3	3,397,680	1,331,484	2,066,196
Year 4	3,737,448	1,464,632	2,272,816
Year 5	4,111,193	1,611,096	2,500,097

Table 4.5. Reduced of Manpower.

	Old Salary	New Salary	Saving
Year 1	5,580,000	5,310,000	270,000
Year 2	6,138,000	5,841,000	297,000
Year 3	6,751,800	6,425,100	326,700
Year 4	7,426,980	7,067,610	359,370
Year 5	8,169,678	7,774,371	395,307

Table 4.6. Reduced of Advertising.

	Old Advertising	New Advertising	Saving
Year 1	5,000,000	4,500,000	500,000
Year 2	5,500,000	4,950,000	550,000
Year 3	6,050,000	5,445,000	605,000
Year 4	6,655,000	5,989,500	665,500
Year 5	7,320,500	6,588,450	732,050

Table 4.7. Reduced of Office Supplies.

	Old Office Supplies	New Office Supplies	Saving
Year 1	60,000	55,000	5,000
Year 2	66,000	60,500	5,500
Year 3	72,600	66,550	6,050
Year 4	79,860	73,205	6,655
Year 5	87,846	80,526	7,320

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(2) The intangible benefits are:

- (a) Improve decision process to dealers by providing faster access to information.
- (b) Reduce mistake in sending transaction record Increasing productivity.
- (c) Having security over connection
- (d) Increase customer satisfaction.
- (e) Planning for growth in the future can do easily.
- (f) Provide better information to help manager in decision making
- (g) Increase competitive chance in automobile market.

(c) Payback Period

To find out the expected number of years required to recover the cost of investment, we can use the formula below. And we will know payback period from the cash flow and after taxes pay back period.

Payback period

Initial Investment or total Investment

(H/W + S/W + Implementation)

Annual saving

Corporate Tax Rate in percent (30%)

The payback period of the proposed network can be calculated as:

$$I/(1 - T) * R$$

$$(340,000 + 75,000 + 183,000)/(0.7) * 3,019,094.05$$

$$598,000/ 2,113,365.835$$

$$.28 \text{ years}$$

From this point, we deduce that the pay back period will be .28 years or 2.8 month. And we can analyze the Annual Cost Comparison and Break Even Analysis by using these tables and figure as seen in the following:

(1) Annual Cost Comparison

It can analyze the cost year by year of proposed network and existing network as shown in Table 4.8. Cost saving in each year can be calculated from Cost of an Existing Network per year — Cost of the proposed Network per year. Therefore, from Table 4.8, Cost saving in each year can be calculated and summarize in the following:

Year 1	=	2,472,600	bahts
Year 2	=	2,719,860	bahts
Year 3	=	2,991,846	bahts
Year 4	=	3,291,031	bahts
Year 5	=	3,620,134	bahts
Average annual saving	=	15,095,470	bahts

(2) Breakeven Analysis

We can analyze the point of cost that invest at the first year compare with the existing network year by year. It is shown in Table 4.9 and Figure 4.12.

(a) An existing network can show the accumulate result as the

Following:

Year 1	=	14,398,400	bahts
Year 2	=	30,235,800	bahts
Year 3	=	47,657,380	bahts
Year 4	=	66,821,118	bahts

Year 5 = 87,901,230 bahts

(b) The proposed network can show the accumulate result as the following:

Year 1 = 11,925,400 bahts

Year 2 = 25,043,340 bahts

Year 3 = 39,473,074 bahts

Year 4 = 55,345,781 bahts

Year 5 = 72,805,760 bahts



Annual Cost Comparison.

Cost Items	Year 1	Year 2	Year 3	Year 4	Year 5	Total
An Existing System						
Communication cost	88,800	97,680	107,448	117,792	128,712	542,732
Salary (5.5 MB/year +10% yearly)	50,000	55,000	60,500	66,050	71,855	292,455
Advertising(5 MB/year + 10% yearly)	50,000	55,000	60,500	66,050	71,855	292,455
Space Rental(840,000/year+10%yearly)	840,000	924,000	1,016,400	1,118,040	1,229,844	5,128,284
Office Supplies(60,000/year + 10% yearly)	60,000	66,000	72,600	79,860	87,046	355,506
Utility Expense(40,000/year+10% yearly)	40,000	44,000	48,400	53,240	58,564	234,244
Miscellaneous Expense(70,000/year+10%yearly)	70,000	77,000	84,700	93,170	102,487	427,427
Total An Existing System	1,498,800	1,637,680	1,789,048	1,954,912	2,138,464	8,968,904
The Proposed System						
Communication cost	88,800	97,680	107,448	117,792	128,712	542,732
Salary (5.31 MB/year +10% yearly)	53,100	58,410	64,251	70,676	77,743	304,180
Advertising(4.5 MB/year + 10% yearly)	53,100	58,410	64,251	70,676	77,743	304,180
Space Rental(840,000/year+10%yearly)	840,000	924,000	1,016,400	1,118,040	1,229,844	5,128,284
Office Supplies(55,000/year + 10% yearly)	55,000	60,500	66,550	73,205	80,075	325,335
Utility Expense(50,000/year+10% yearly)	50,000	55,000	60,500	66,050	71,855	292,455
Miscellaneous Expense(70,000/year+10%yearly)	70,000	77,000	84,700	93,170	102,487	427,427
Total An Proposed System	1,496,900	1,632,590	1,779,899	1,948,734	2,139,918	8,998,341
Total Annual Cost Saving	1,900	5,090	10,149	6,178	48,546	80,063
Average Annual Cost Saving	16,672					

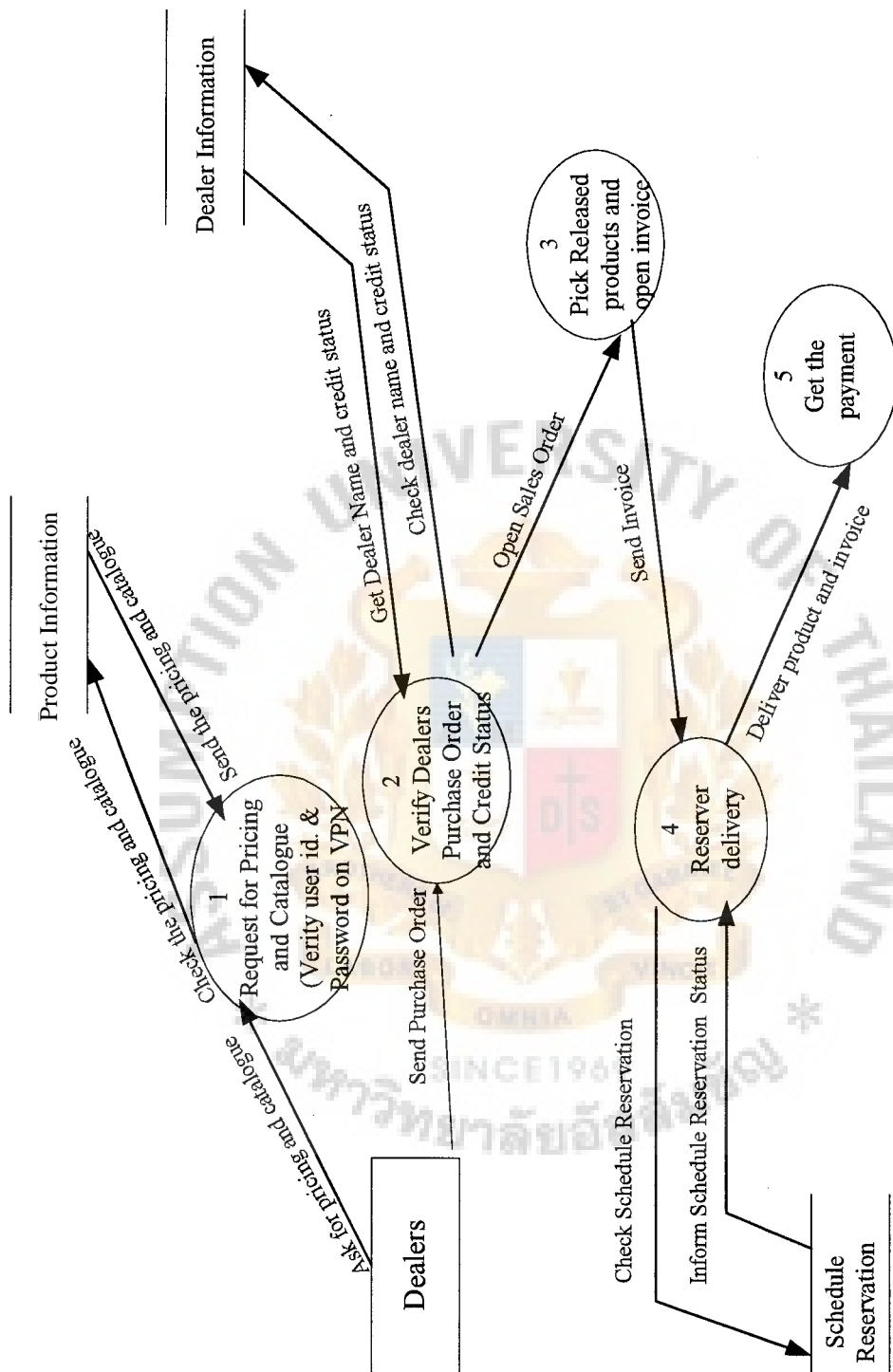
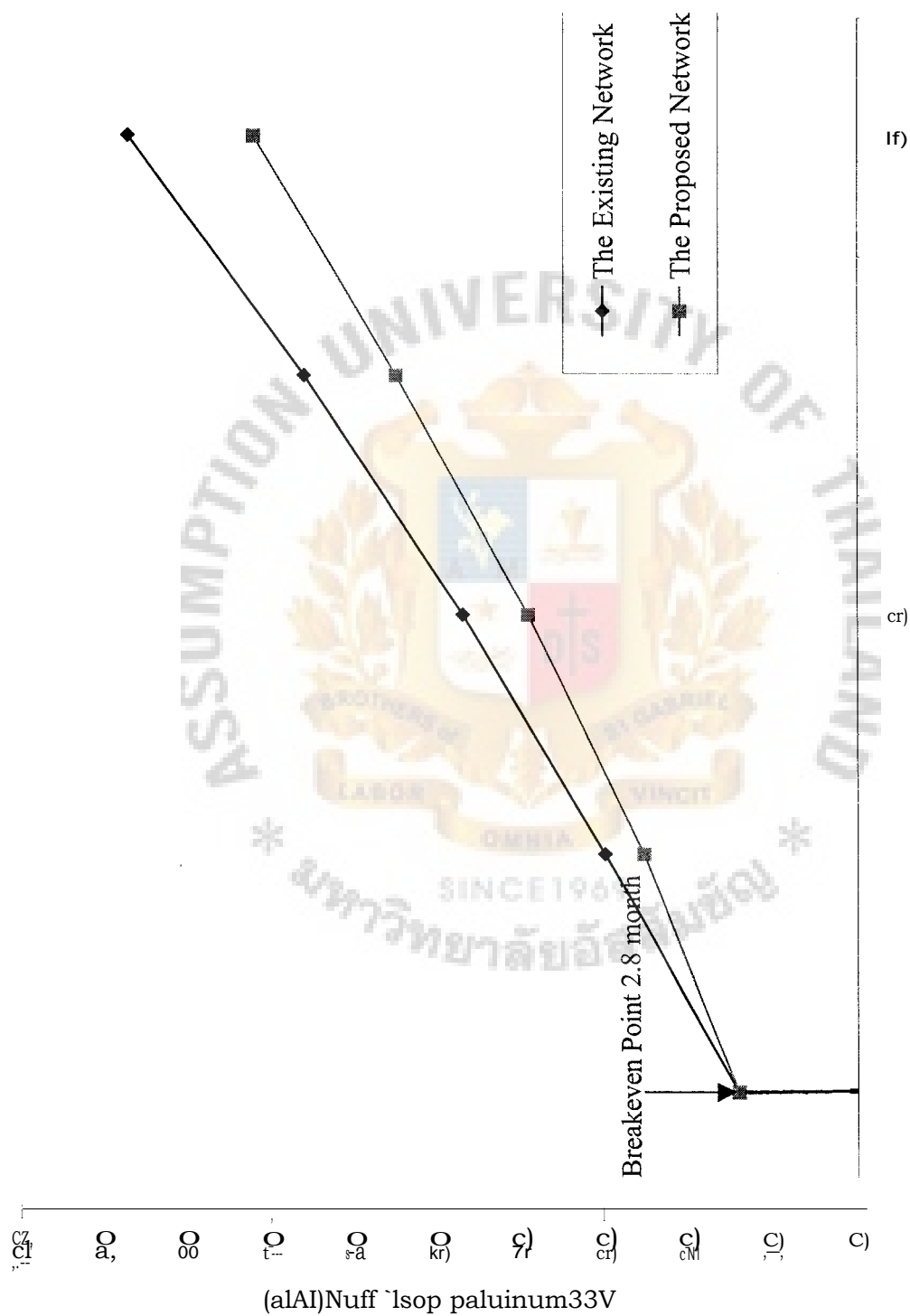


Figure 4.6. Data Flow Diagram Level 0.

Table 4.9. Breakeven Analysis.

Cost Items	Year 1	Year 2	Year 3	Year 4	Year 5	Total
An Existing System						
Communication cost	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	9,000,000
Salary (5.58 MB/year +10% yearly)	1,000,000	1,100,000	1,210,000	1,331,000	1,464,100	6,906,100
Advertising(5 MB/year + 10% yearly)	500,000	550,000	605,000	665,500	732,050	3,057,550
Space Rental(840,000/year+10%yearly)	840,000	924,000	1,016,400	1,118,040	1,229,844	5,128,284
Office Supplies(60,000/year + 10% yearly)	60,000	66,000	72,600	79,860	87,846	366,306
Utility Expense(40,000/year+10% yearly)	40,000	44,000	48,400	53,240	58,564	243,444
Miscellaneous Expense(70,000/year+10%yearly)	70,000	77,000	84,700	93,170	102,487	427,427
Total Accumulated Existing System	5,960,000	6,524,000	7,138,100	7,811,118	8,547,347	35,980,665
The Proposed System						
Hardware and Installation Cost(340,000)/5 year	340,000	340,000	340,000	340,000	340,000	1,700,000
Software and Installation Cost(75,000)/5 years	75,000	75,000	75,000	75,000	75,000	375,000
Implementation Cost (183,000)/ 5 years	183,000	183,000	183,000	183,000	183,000	915,000
Communication cost	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	9,000,000
Salary (5.31 MB/year +10% yearly)	1,000,000	1,100,000	1,210,000	1,331,000	1,464,100	6,906,100
Advertising(4.5 MB/year + 10% yearly)	500,000	550,000	605,000	665,500	732,050	3,057,550
Space Rental(840,000/year+10%yearly)	840,000	924,000	1,016,400	1,118,040	1,229,844	5,128,284
Office Supplies(55,000/year + 10% yearly)	55,000	60,500	66,550	73,205	80,525	335,780
Utility Expense(50,000/year+10% yearly)	50,000	55,000	60,500	66,550	73,205	305,255
Miscellaneous Expense(70,000/year+10%yearly)	70,000	77,000	84,700	93,170	102,487	427,427
Total Accumulated Proposed System	5,948,000	6,524,000	7,138,100	7,811,118	8,547,347	35,980,665



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4.7 VPN Security and Appliances: Protecting the Network

Deploying WANs on a shared network makes security issues paramount. Enterprises need to be assured that their VPNs are secure from perpetrators observing or tampering with confidential data passing over the network and from unauthorized users gaining access to network resources and proprietary information. Encryption, authentication, and access control guard against these security breaches. Key components of VPN security follows:

- (1) Tunnels and encryption
- (2) Packet authentication
- (2) Firewalls and intrusion detection
- (3) User authentication

These mechanisms complement each other, providing security at different points throughout the network. VPN solutions must offer each of these security features to be considered a viable solution for utilizing a public network infrastructure.

Tunnels and Encryption

Cisco VPN solutions employ encrypted tunnels to protect data from being intercepted and viewed by unauthorized entities and to perform multiprotocol encapsulation, if necessary. Tunnels provide logical, point-to-point connections across a connectionless IP network, enabling application of advanced security features. Encryption is applied to the tunneled connection to scramble data, thus making data legible only to authorized senders and receivers. In applications where security is less of a concern, tunnels can be employed without encryption to provide multiprotocol support without privacy.

Cisco VPNs employ IP Security (IPSec), Point-to-Point Tunneling Protocol (PPTP), Layer 2 Tunneling Protocol (L2TP), Layer 2 Forwarding (L2F), and generic

routing encapsulation (GRE) for tunnel support, as well as the strongest standard encryption technologies available---Data Encryption Standard (DES), 3DES, and 40/128-bit RC4 for Microsoft Point-to-Point Encryption (MPPE). Furthermore, Cisco VPN solutions support major certificate authority vendors, such as Verisign and Entrust, for managing security/encryption administration.

Packet Authentication

Although interception and viewing of data on a shared network is the primary security concern for enterprises, data integrity is also an issue. On an unsecured network, packets can be intercepted by a perpetrator, the contents changed, then forwarded on to their destination with erroneous information. For example, an order placed to a supplier over an unsecured network could be modified by a perpetrator, changing the order quantity from 1000 to 100. Packet authentication protects against such tampering by applying headers to the IP packet to ensure its integrity. Components of IPSec, Authentication Header (AH), and Encapsulation Security Protocol (ESP) are employed in conjunction with industry-standard hashing algorithms such as Message Digest 5 (MD5) and secure hash algorithm (SHA) to ensure data integrity of packets transmitted over a shared IP backbone.

Firewalls, Intrusion Detection, and Security Auditing

A critical part of an overall security solution is a network firewall, which monitors traffic crossing network perimeters and imposes restrictions according to security policy. In a VPN application, firewalls protect enterprise networks from unauthorized access to computing resources and network attacks, such as denial of service. Furthermore, for authorized traffic, a VPN firewall verifies the source of the traffic and prescribes the access privileges that users are permitted. Cisco VPN solutions provide enterprises flexibility in firewall choices, offering Cisco IOS software-based firewalls

resident on VPN routers, as well as the separate PIX Firewall appliance. Utilizing IPSec software, the PIX Firewall can also serve as a VPN tunneling and encryption appliance. An added element of assurance in perimeter security is intrusion detection. While firewalls permit or deny traffic based on source, destination, port, and other criteria, they do not actually analyze traffic. Intrusion-detection systems, such as the Cisco NetRanger® system, operates in conjunction with firewalls to extend perimeter security to the packet payload level by analyzing the content and context of individual packets to determine if the traffic is authorized. If the data stream of a network experiences unauthorized activity, NetRanger software automatically applies real-time security policy, such as disconnecting the offending session, and notifies a network administrator of the incident. The NetRanger products provide automated monitoring and response for more robust network security while simultaneously reducing personnel costs associated with perimeter monitoring.

Firewalling and intrusion detection provide strong defense mechanisms against network attacks, but strong security begins inside the corporate network by ensuring that security vulnerabilities are minimized. Security auditing systems, such as the Cisco NetSonar software, scan the corporate network to identify potential security risks. NetSonar software maps all active systems on a network, their operating systems and network services, and their associated potential vulnerabilities. NetSonar software also proactively and safely probes systems using its comprehensive network security database to confirm vulnerabilities, and provides detailed information about security vulnerabilities, enabling network managers to better secure the network from attacks.

User Authentication

A key component of VPN security is ensuring that authorized users gain access to enterprise computing resources they need, while unauthorized users are shut out of the

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network entirely. Cisco VPN solutions are built around authentication, authorization, and accounting (AAA) capabilities that provide the foundation to authenticate users, determine access levels, and archive all the necessary audit and accounting data. Such capabilities are paramount in the dial-access and extranet applications of VPNs. Cisco VPN solutions support Remote Access Dial-In User Service (RADIUS) and Terminal Access Controller Access Control System Plus (TACACS+) user authentication protocols for centralized AAA services.

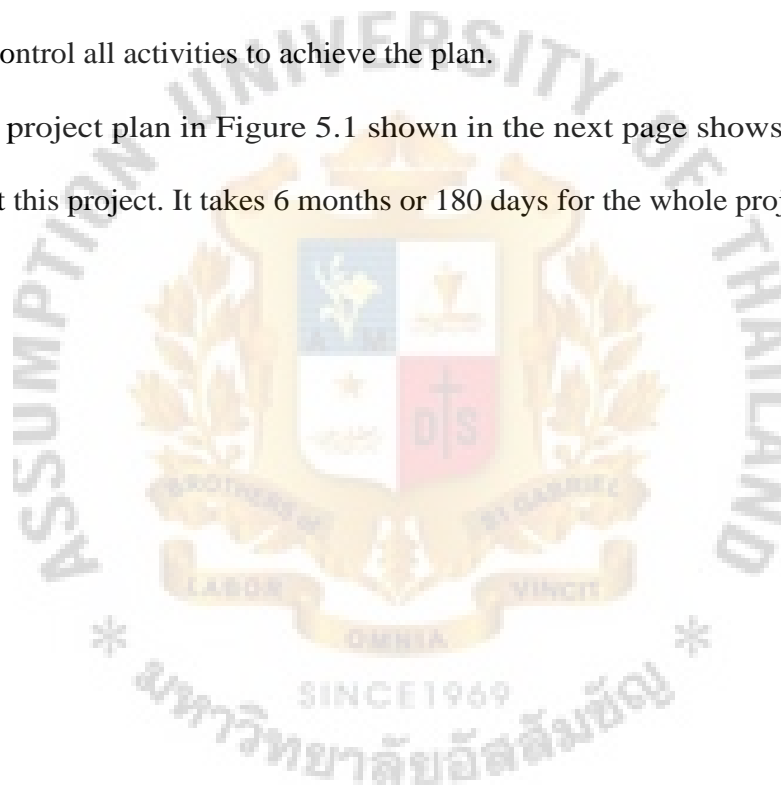


V. IMPLEMENTATION

5.1 Project Implementation

After the proposed system was submitted to the management, and then the management has agreed and accepted to develop this new system. Then the project owner will start to implement this project and he/she must consider every factors involved. The time is the most important factor which the project owner must consider seriously. Therefore, he/she must plan his/her schedule, it must be shown in a project plan and control all activities to achieve the plan.

The project plan in Figure 5.1 shown in the next page shows the schedule to implement this project. It takes 6 months or 180 days for the whole project.



Sl. No.	Task Name	Duration	Qtr 1, 2000				Qtr 2, 2000				Qtr 3, 2000			
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Finding the Title of Topic	40 days												
2	Preliminary Investigation	21 days												
3	Study Current System	28 days												
4	Investigation of Users Requirement	7 days												
5	Make Objectives and Scope	7 days												
6	System Analysis and Design	42 days												
7	Draw the context Diagram	14 days												
8	Draw the Data Flow Diagram	14 days												
9	Design Process Specification	28 days												
10	Design Input and Output Screen	7 days												
11	Design the System Configuration	14 days												
12	Hardware Requirement	28 days												
13	Software Requirement	7 days												
14	Making the Cost and Benefit Analysis	14 days												
15	Training System Admin & User	5 days												
16	Testing the New System	30 days												

Project Plan.

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5.2 Process Implementation

Since we have already had Local Area Network(LAN) system, so there is no need to prepare the LAN equipment. This helps us to save time. Moreover, we can use outsourcing that is an ISP so it benefits us who does not need to invest all the network infrastructure such as modem pool, all equipment at ISP' s node, leased line and manpower. This helps us to save a lot of money both of one time cost and on-going cost.

The benefit of Virtual Private Network(VPN) system is easier to append or attach with any systems, because it does not depend on any system. Therefore, after we get the approval from the management, we can go on to implement it by joining with one ISP named LOXINFO and it takes a short time for this type of implementation.

Project owner will start to implement the proposed system as seen in 5 stages below:

(a) System Development

(1) Apply leased line service

Company can apply leased line with one of the media providers such as Telecom Asia , UIH etc. The ISP is responsible to contact one media provider untill leased line is installed.

(2) Develop the Radius System

(a) Find a radius server software

The ISP is responsible to find this software which the ISP commit to provide it with no charge.

(b) Find a radius server hardware (Authentication server)

A radius server is an authentication server. The company has to find a computer server, the required specification as seen in Appendix A.

(c) Find Networking

Networking means router, company has to find out a router which support VPN function. The required specification see as Appendix A.

(b) System Testing

Before installation, we must try to test the system to make sure that the new system is complete and it can replace the existing system absolutely.

(c) VPN System Installation

This process concerns installing software and configure hardware. It will be done by the ISP.

(d) System Training

The training course will be held after the system has been installed completely. The training course is divided into 2 courses. The first one is for system administrator and the last one is for user training.

(1) VPN training course for system Administrator

Training is a must to every organization. It's not only to teach how to use the technology but also how to exploit it and cope with the changes it will bring. Training is not just limited to the first time. The rapid changes in technology in technology itself with new capabilities, enhancements, and release comes at a faster pace result in a

continuing need for ongoing education and training of new coming technology.

The training course will be set up suddenly after proposed system was setup. The system administrator must take this course so that they can operate the system in the head office in Bangkok and give dealers his/her help whenever they need. This course is set up by an ISP which company applied Virtual Private Network Service. Since Windows NT networking is a part of this system, so it will take some parts of this course. The system administrator can re-educate about it. And then they can learn about the VPN system more.

This ISP shows some description of the Virtual Private Network for system administrator as following.

(a) Windows NT networking environment

- (1) Describe the Windows NT network environment
- (2) Explain the components of the windows NT network architecture

(b) Configuration windows NT protocols

- (1) TCP/IP
- (2) NWLINK
- (3) NetBeui
- (4) Configuring networking bindings

(c) Windows NT networking services

- (1) Installing Network Services
- (2) Computer Browser Services

(3) Dynamic Host Configuration Protocol (DHCP)

(4) Windows Internet Name Service (WINS)

(5) Domain Name System (DNS)

(d) Internetworking and Intranetworking

(1) Internet VS Intranet

(2) Installing and Configuring IIS

(3) Using Internet Explorer

(4) Securing Internet and Intranet Sites

(e) Troubleshooting windows NT

(1) Troubleshooting Categories

(2) Diagnostic Utilities

(3) Resources for Troubleshooting

(e) Introduce to the Virtual Private Network

(1) Security appliances

(2) Tunnels and encryption

(3) Package authentication

(4) Firewalls, Intrusion Detection, and Security Auditing

(5) User authentication

(f) Type of Virtual Private Network

(1) Remote Access VPNs

(2) Intranet VPNs

(3) Extranet VPNs

(g) Configuring Virtual Private Network

(1) Layer 2 Tunneling Protocol (L2TP) overview

(2) Configure Virtual Private Dial Network (VPDN) on the

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- (3) Home Gateway Router
- (4) Configure Virtual Private Dial Network Access Server
- (h) Monitor VPDN Virtual Interface
 - (1) VPDN MIB and Syslog Facility
 - (2) Configuration Task
 - (4) Configuration Event Logging
- (i) VPDN Configuration Examples
- (2) User Training Course

After system administrator has been trained, the user both in the head office and dealer also must be trained for user training course.

The detail of the user training course is shown as the following.

- (a) Introduction to Windows 98
- (b) Internet and World Wide Web
- (c) How to Use the Web Browser
- (d) Searching the World Wide Web
- (e) Electronic Mail (Eudora Program)
- (f) IRC: Internet Relay Chat (Microsoft Chat)
- (g) Summary / Questions

5.3 Productivity Gain from the Proposed Network

We consider productivity gain into four parts; Intranet; extranet; security gain and others. All productivity gain after the proposed system was set up shows you the details below:

(a) Intranet

- (1) The information is more accuracy because dealers can update transaction records whenever it is happened.

- (2) All staffs can send e-mail to each other within the same local area network (LAN).
- (3) The database was shared to anyone who has authorized to access it.
- (4) Everyone in the same Intranet can get the same information that they want.
- (5) The utilization in Intranet system is more efficiency.
- (6) The communication within Intranet system is increase reliability.

(b) Extranet

The following are the productivity gain in the extranet.

- (1) All Dealers can access the information at head office every time they want at a fraction of the cost.
- (2) Head office can send the information that they want to update to their dealers every time they want at a fraction of the cost.
- (3) All dealers and the head office can share and distribute information to each other at a fraction of the cost.
- (4) Now the information is accurate because it has been updated in the real-time system.
- (5) All dealers can send e-mail to other dealers or to the head office every time they want.
- (6) All dealers can save the paper cost because they can send it by attaching in the e-mail.
- (7) Since company can dial through Internet Service Provider (ISP)'s node, so they can save the cost of long distance telephones and fax.
- (8) It helps company to decrease the working time within dealer connection.

- (9) Communication between the head office and branches is more fast.
- (10) Head office can announce the campaign or the promotion to its dealers using e-mail with lower cost. And their package can be sent to them at the same time.
- (11) The document can be sent to each other easier by using via e-mail.

(c) Security Gain.

The followings are the productivity gain form the proposed system involved security issue.

- (1) Authentication gain means information and other computer resources can be access by authorized users only.
- (2) Integrity gain means information is only modified by users who have a right to do.
- (3) Confidentially gain means information is only disclosed to those user who are authorized to have access to it.

(d) Others

- (1) To gain competitive advantage.
- (2) To save cost of long telephone and fax
- (3) To save time to operate between head office and its dealers.
- (4) To improve the speed and accuracy of our customers; dealers and head office 's communication.
- (5) To improve productivity of our staff.
- (6) To make the paperless system.
- (7) To enhance new technology's knowledge to our staff.
- (8) Save the cost of advertising.
- (9) Save the time to distribute advertising to dealers and customers.

VI. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The company recognizes an existing network and found that there are many problems have been found out such as a great cost of long distance calls, slow working process, duplication of work and inaccurate data etc. Therefore, we must find out the new network and have to make sure that the proposed network can solve these problems.

The objective of new network is to study, analyze, design, and implement VPN to enhance connectivity and security to organization and its dealers. VPN is one of data transmission technology using access information to each other through Internet Infrastructure. By encryption data, it makes the highest security in communication networking and it helps organization to save a lot of initial cost and operation cost. The main reasons why VPN was considers are the initial investment will not be much more than the cost when building own organization network, and the plan to expand branches or user is easier. Therefore, Virtual. Private Network will be the best choice of organizations which have a lot of branches or partners or dealers and want them access into firm's Intranet.

After VPN was set up completely, about 95% of the problem was fixed. All work process have the efficiency, cost of product was reduced due to deduction of long distance cost. The connection between the head office and dealers are smoother than before. They can send and receive information to each other at the right time. Cost of long distance telephone calls and fax has been taken out. The top management can closely monitor business transactions and can respond to all problems at the right time and at the right place. This results in the implementation of the new network to help

organization to reduce cost, to gain market share and to get the maximum profit and enhance competitive advantage.

6.2 Recommendations

I recommend that we should develop the web server and rent Internet service from an Internet Service Provide (ISP) in the near future. The objective is to do the business on the web site such as Electronic Commerce on our web site. All customers using Internet over Thailand could find information involve in our product and service on web at the right time. We can save cost of advertising which we have to invest at least 5,000,000 baht every year. And the next stage, we should apply that web to do transactions via Internet, these can be done both of Business-to-Business called "B2B" and Business-to-Consumer called "B2C". The cost of developing a web site is less than the benefit which companies will get back in the long term. If it is successful, companies will have the important tools to help increase competitive advantage. And companies can gain the market share in a short period which meet the company's goal absolutely.



APPENDIX A

SPECIFICATION OF HARDWARE REQUIREMENTS

Hardware and Software Requirements for VPNs

(a) Head Quarter's site:

(1) Hardware requirement.

(a) CISCO router 1700, 2500 or 2600 up series with specific IOS to support VPN

- (1) 10/100BaseT Modular Router W/2 WAN slot
- (2) Cisco IOS IP SW
- (3) IP Feature Pack
- (4) 2-Port Serial WAN Interface Card
- (5) V.35 Cable, DTE Male to Smart Serial 10 Feet

(b) PC Server for Radius server (Authentication server)

- (1) Pentium III
- (2) 128 MB RAM
- (3) 2 GB HD

(2) Software Requirement

(a) O/S can be

- (1) Microsoft Windows NT 4.0 Full Pack with 5 License or
- (2) Unix system

(b) Radius software:

- (1) Livingston (Incase of O/S is Microsoft Windows NT)
- (2) Merrit (Incase of O/S is Unix system)
- (3) Leased line connection, minimum speed at 64 Kbps
- (4) VPN access service, minimum speed at 64 Kbps.

(b) Dealers site or remote user

(1) Hardware requirement

- (a) PC with Pentium 133 up
- (b) Modem minimum speed at 56 Kbps.

(2) Software requirement

- (a) Windows 95, 98 with dial up networking or NT with remote access service
- (b) Internet application i.e. Dial-up Networking, Microsoft Internet Explorer, Netscaper, ICQ or IRC, Internet mail such Eudora, Netscape Mail etc., FTP program.

(3) Telephone line 1 line per 1 site





APPENDIX B

OTHER RELATED TERMS

Others Related Technical Terms

Data Transmission

(a) Digital and analog transmission

Digital transmission sends data as distinct pulses, either on or off, in much the same way that data travels through the computer. Communication devices such as telephone lines, coaxial cables, and microwave circuits are already in place for voice transmission. Thus, the most common communications devices all use analog transmission, a continuous electric signal in the form of a wave.

(b) Asynchronous and synchronous transmission

Two techniques commonly used to keep the sending and receiving units dancing to the same tune are asynchronous and synchronous transmission.

When asynchronous transmission (also called start/stop transmission) is used, a special start signal is transmitted at the beginning of each group of message bits—a group is usually just a single character. Likewise, a stop signal is sent at the end of the group of message bits. When the receiving device gets the start signal, it sets up a timing mechanism to accept the group of message bits.

Synchronous transmission is a little trickier because characters are transmitted together in a continuous stream. There are no call-to-action signals for each character. Instead, the sending and receiving devices are synchronized by having their clocks put in time with each other by a bit patterns transmitted at the beginning of the message. Furthermore, error check bits are transmitted at the end of each message to make sure all

characters were received properly. Synchronous transmission equipment is more complex and more expensive but, without all the start/stop bits, transmission is much faster.

(c) Simplex, half-duplex, and full-duplex transmission

Data transmission can be characterized as simplex, half-duplex, or full duplex, depending on permissible direction of traffic flow.

- (1) Simplex transmission sends data in one direction only everyday examples are television broadcasting and arrival/departure screens at airports.
- (2) Half-duplex transmission allows transmission in either direction, but only one way at a time. An analog is talk on a CB radio. In a bank a teller using half-duplex transmission can send the data about a deposit and, after it is received, the computer can send a confirmation reply.
- (3) Full-duplex data transmission means that data can be transmitted in both directions on a signal carrier at the same time. For example, on a local area network with a technology that has full-duplex transmission, one work station can be sending data on the line while another workstation is receiving data. Full-duplex transmission necessarily implies a bi-directional line (one that can move data in both directions).

Communication Link

Communication link means transmission media functions to transmit data or package. There are several kinds of communication links.

(a) Wire pairs

One of most common communications media is the wire pair, also known as the twisted pair. Wire pair are twisted together to form a cable, which is then insulation. Wire pairs are inexpensive. Further, they are often used because they had already been installed in a building for other purposes or because they are had already in use in telephone systems. However, they are susceptible to electrical interference, or noise. Noise is anything that causes distortion in the signal when it is received. High-voltage equipment and even the sun can be sources of noise.

(b) Coaxial cables

Known for sending a strong signal, a coaxial cable is a single conductor wire within a shielded enclosure. Bundles of cables can be laid underground or undersea. These cables can transmits data much faster than wire pairs and are less prone to noise.

(c) Fiber optic

Traditionally, most phone lines transmitted data electrically over wires made of metal, usually copper. These metal wires had to be protected from water and other corrosive substances. Fiber optics technology eliminates this requirement. Instead of using electricity to send data, fiber optic uses light. The cables are made of glass fibers, each thinner than human hair, that can guide light beams for miles. Fiber optics transmits data faster than some technologies, yet the materials are substantially lighter and less expensive than wire cables. It can also send and receive a wider assortment of data frequencies at one time. The range of frequencies that a device can handle is known as its bandwidth; bandwidth is a measure of the capacity of the link. The broad bandwidth of fiber optic translates into promising multimedia

possibilities, since fiber optic is well suited for handling all types of data—voices, pictures, music, and video—at the same time.

(d) Microwave transmission

Another popular medium is microwave transmission, which uses what is called line-of-sight transmission of data signals through the atmosphere. Since these signals cannot bend around the curvature of the earth, relay stations, often antennas in high places such as the tops of mountains and buildings, are positioned at points approximately 30 miles apart to continue the transmission. Microwave transmission offers speed, cost-effectiveness, and ease of implementation. Unfortunately, in major metropolitan areas tall building may interfere with microwave transmission.

(e) Satellite transmission

The basis components of satellite transmission are each station, which send and receive signals, and a satellite component called a transponder. The transponder receives the transmission from an earth station, amplifies the signal, changes the frequency, and retransmits data to a receiving earth station. This entire process takes a matter of a few seconds.

(f) Integrated Services Digital Network (ISDN)

Integrated Services Digital Network (ISDN) is a set of CCITT/TU standards for digital transmission over ordinary telephone copper wire as well as over other media. Home and business users who install ISDN adapter (in place of their modems) can see highly-graphic Web pages arriving very quickly (up to 128 Kbps.). ISDN requires adapters at both ends of the transmission so your access provider also needs an ISDN

adapter. ISDN is generally available from your phone company in most urban areas in the United States and Europe.

There are two levels of service: the Basic Rate Interface (BRI), intended for the home and small enterprise, and the Primary Rate Interface (PRI), for larger users. Both rates include a number of B (bearer) Channel and a D (delta) channel. The B channels carry data, voice, and other services. The D channel carries control and signaling information.

The Basic Rate Interface consists of two 64 Kbps B channels and one 16 Kbps D channel. Thus, a Basic Rate user can have up to 128 Kbps service. Integrated Services Digital Network in concept is the integration of both analog or voice data together with digital data over the same network. Although the ISDN you can install is integrating these on a medium designed for analog transmission, broadband ISDN (BISDN) will extend the integration of both services throughout the rest of the end-to-end path using fiber optic and radio media. Broadband ISDN will encompass framerelay service for high-speed data that can be sent in large bursts, the Fiber Distributed-Data Interface (FDDI), and the Synchronous Optical Network (SONET). BISDN will support transmission from 2 Mbps up to much higher.

Asymmetric Digital Subscriber Line (ADSL)

ADSL (Asymmetric Digital Subscriber Line) is a technology for transmitting digital information at high bandwidths on existing phone lines to homes and businesses. Unlike regular dialup phone service, ADSL provides continuously-available, "always on" connection. ADSL is asymmetric in that it uses most of the channel to transmit downstream to the

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user and only a small part to receive information from the user. ADSL simultaneously accommodates analog (voice) information on the same line. ADSL is generally offered at downstream data rates from 512 Kbps. to about 6 Mbps.. A form of ADSL, known as Universal ADSL or G Lite, has been initially approved as a standard by the ITU.

ADSL was specifically designed to exploit the one-way nature of most multimedia communication in which large amounts of information flow toward the user and only a small amount of interactive control information is returned.

Intranet

An intranet is a private network that is contained within an enterprise. It may consist of many interlinked local area networks and also use leased line in the wide area networks Typically, an intranet includes connections through one or more gateway computers to the outside Internet. The main purpose of an intranet is to share company information and computing resources among employees. An intranet can also be used to facilitate working in groups and for teleconferences.

An intranet uses TCP/IP, HTTP, and other Internet protocols and in general looks like a private version of the Internet. With tunneling, companies can send private messages through the public network, using the public network with special encryption/decryption and other security safeguards to connect one part of their intranet to another.

Typically, larger enterprises allow users within their intranet to access the public Internet through firewall servers that have the ability to screen messages in both directions so that company security is maintained. When part of an intranet is made

accessible to customers, partners, suppliers, or others outside the company, that part becomes part of an extranet.

Extranet

An extranet is a private network that uses the Internet protocols and the public telecommunication system to securely share part of a business's information or operations with suppliers, vendors, partners, customers, or other businesses. An extranet can be viewed as part of a company's intranet that is extended to users outside the company. It has also been described as a "state of mind" in which the Internet is perceived as a way to do business with other companies as well as to sell products to customers. The same benefits that HTML, HTTP, SMTP, and other Internet technologies have brought to the Internet and to corporate intranets now seem designed to accelerate business between businesses.

An extranet requires security and privacy. These require firewall server management, the issuance and use of digital certificates or similar means of user authentication, encryption of messages, and the use of virtual private networks (VPNs) that tunnel through the public network.

Companies can use an extranet to:

- (a) Exchange large volumes of data using Electronic Data Interchange (EDI)
- (b) Share product catalogs exclusively with wholesalers or those "in the trade"
- (c) Collaborate with other companies on joint development efforts
- (d) Jointly develop and use training programs with other companies
- (e) Provide or access services provided by one company to a group of other companies, such as an online banking application managed by one company on behalf of affiliated banks

(f) Share news of common interest exclusively with partner companies

Netscape, Oracle, and Sun Microsystems have announced an alliance to ensure that their extranet products can work together by standardizing on JavaScript and the Common Object Request Broker Architecture (CORBA) Microsoft supports the Point-to-Point Tunneling Protocol (PPTP) and is working with American Express and other companies on an Open Buying on the Internet (OBI) standard. The Lotus Corporation is promoting its groupware product, Notes, as well-suited for extranet use.

Internet

The Internet, sometimes called simply "the Net," is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get information from any other computer (and sometimes talk directly to users at other computers). It was conceived by the Advanced Research Projects Agency (ARPA) of the U.S. government in 1969 and was first known as the ARPANet. The original aim was to create a network that would allow users of a research computer at one university to be able to "talk to" research computers at other universities. A side benefit of ARPANet's design was that, because messages could be routed or rerouted in more than one direction, the network could continue to function even if parts of it were destroyed in the event of a military attack or other disaster.

Today, the Internet is a public, cooperative, and self-sustaining facility accessible to hundreds of millions of people worldwide. Physically, the Internet uses a portion of the total resources of the currently existing public telecommunication networks. Technically, what distinguishes the Internet is its use of a set of protocols called TCP/IP (Transmission Control Protocol/Internet Protocol). Two recent adaptations of Internet technology, the Intranet and the Extranet, also make use of the TCP/IP protocol.

For many Internet users, electronic mail (e-mail) has practically replaced the Postal Service for short written transactions. Electronic mail is the most widely used application on the Net. You can also carry on live "conversations" with other computer users, using IRC (Internet Relay Chat). More recently, Internet Telephony hardware and software allows real-time voice conversations.

The most widely used part of the Internet is the World Wide Web (often abbreviated "WWW" or called "the Web"). Its outstanding feature is hypertext, a method of instant cross-referencing. In most Web sites, certain words or phrases appear in text of a different color than the rest; often this text is also underlined. When you select one of these words or phrases, you will be transferred to the site or page that is relevant to this word or phrase. Sometimes there are buttons, images, or portions of images that are "clickable." If you move the pointer over a spot on a Web site and the pointer changes into a hand, this indicates that you can click and be transferred to another site.

Using the Web, you have access to millions of pages of information. Web "surfing" is done with a Web browser, the most popular of which are Netscape Navigator and Microsoft Internet Explorer. The appearance of a particular Web site may vary slightly depending on the browser you use. Also, later versions of a particular browser are able to render more "bells and whistles" such as animation, virtual reality, sound, and music files, than earlier versions.

Internet Service Provider (ISP)

Internet Service Provider is only the organizations which The Communications Authority of Thailand (CAT) allow them to provide Internet access through transmission media such as telephone line, leased line or ISDN etc. Users or company can apply them to ISP when they want to get Internet by pay ISP some charge depend

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on the price of each package. The partial list of ISPs are Internet Thailand, KSC, LoxInfo etc.

Media Provider

Media providers are the organizations which provide transmission media to users or any companies or Internet Service Providers (ISPs). For example, Telecom Asia Ltd. (TA) provide telephone line, leased line, United Information Highway Co.,Ltd. (UIH) provide leased line, Frame Relay etc. ISPs may apply leased line to connect Internet between it and their customers so that their customers can use Internet through that ISP's Internet route.

Protocol

In information technology, a protocol (pronounced PROH-tuh-cahl, from the Greek protocollon, which was a leaf of paper glued to a manuscript volume, describing its contents) is the special set of rules for communicating that the end points in a telecommunication connection use when they send signals back and forth. Protocols exist at several levels in a telecommunication connection. There are hardware telephone protocols. There are protocols between the end points in communicating programs within the same computer or at different locations. Both end points must recognize and observe the protocol. Protocols are often described in an industry or international standard. On the Internet, there are the TCP/IP protocols, consisting of:

- (a) TCP (Transmission Control Protocol), which uses a set of rules to exchange messages with other Internet points at the information packet level.
- (b) IP (Internet Protocol), which uses a set of rules to send and receive messages at the Internet address level.
- (c) HTTP, FTP, and other protocols, each with defined sets of rules to use with other Internet points relative to a defined set of capabilities.

Layer 2 Protocol (L2TP)

The Layer 2 Tunnel Protocol (L2TP) is an emerging Internet Engineering Task Force (IETF) standard that combines the best features of two existing tunneling protocols: Cisco's Layer 2 Forwarding (L2F) and Microsoft's Point-to-Point Tunneling Protocol (PPTP). L2TP is an extension to the Point-to-Point Protocol (PPP), which is an important component for VPNs. VPNs allow users and telecommuters to connect to their corporate intranets or extranets. VPNs are cost-effective because users can connect to the Internet locally and tunnel back to connect to corporate resources. This not only reduces overhead costs associated with traditional remote access methods, but also improves flexibility and scalability.

Traditional dial-up networking services only support registered IP addresses, which limits the types of applications that are implemented over VPNs. L2TP supports multiple protocols and unregistered and privately administered IP addresses over the Internet. This allows the existing access infrastructure, such as the Internet, modems, access servers, and ISDN terminal adapters (TAs), to be used. It also allows enterprise customers to outsource dialout support, thus reducing overhead for hardware maintenance costs and 800 number fees, and allows them to concentrate corporate gateway resources. L2TP offers the following benefits:

- (a) Vendor interoperability.
- (b) Can be used as part of the wholesale access solution, which allows ISPs to the telco or service providers offer VPNs to Internet Service Providers (ISPs) and other service providers.
- (c) Can be operated as a client initiated VPN solution, where enterprise customers using a PC, can use the client initiated L2TP from a third party.

(d) All value-added features currently available with Cisco's L2F, such as load sharing and backup support, will be available in future IOS releases of L2TP.

(a) Supports Multihop, which enables Multichassis Multilink PPP in multiple home gateways. This allows you to stack home gateways so that they appear as a single entity.

Layer 2 Forwarding (L2F)

Cisco's VPDN uses the Layer 2 Forwarding protocol (L2F) which permits the tunneling of link level frames. Using L2F tunneling, an Internet Service Provider (ISP) or other access service can create a virtual tunnel to link a customer's remote sites or remote users with corporate home networks. In particular, a network access server at the ISP's point of presence (POP) exchanges PPP messages with the remote users, and communicates by L2F requests and responses with the customer's home gateway to set up tunnels.

L2F passes protocol-level packets through the virtual tunnel between endpoints of a point-to-point connection. Frames from the remote users are accepted by the ISP's POP, stripped of any linked framing or transparency bytes, encapsulated in L2F, and forwarded over the appropriate tunnel. The customer's home gateway accepts these L2F frames, strips the L2F encapsulation, and processes the incoming frames for the appropriate interface. Note This implementation of VPDN supports PPP dialup only.

Password Authentication Protocol (PAP)

A simple PPP authentication mechanism in which a cleartext username and password are transmitted to prove identity. PAP is not as secure as CHAP because the password is passed in "cleartext."



APPENDIX C

LONG DISTANCE TELEPHONE RATE OF 15 UPCOUNTRY DEALERS

Table C.1. Long Distance Telephone Rate of 15 Upcountry Dealers.

	Province	distance	elenhone rate
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		Area code	Long Distance rate
1.	Suphanburi	(035)	15 bahts/minute
2.	Nakhonpatom	(034)	3 bahts/minute
3.	Ayutthaya	(035)	3 bahts/minute
Northern Region:			
4.	Chiang Mai	(053)	18 bahts/minute
5.	Chiang Rai	(053)	18 bahts/minute
6.	Phitsanulok	(056)	12 bahts/minute
7.	Nakhonsawan	(055)	12 bahts/minute
Southern Region			
8.	Phuket	(076)	18 bahts/minute
9.	Songkhla	(074)	18 bahts/minute
10.	Nakhonsithammarat	(075)	18 bahts/minute
Eastern Region			
11.	Chonburi (Pattaya)	(038)	6 bahts/minute
12.	Rayong	(038)	9 bahts/minute
Northeastern Region: Re.0101			
13.	Khon Kaen	(043)	15 bahts/minute
14.	Nakhon Ratchasima	(044)	12 bahts/minute
15.	Ubon Ratchathani	(045)	15 bahts/minute

Source: Telephone Organization of Thailand's Rate



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Table D.1 The Name List of LOXINFO' s Nationwide Nodes and Tel. No.

	Province	iephone no. tn.dial to	:Lena D MOO Late
1.	Bangkok	(02) 671-9400, 622-5555, 225-3455 For 56 K. Modem (02) 340-0999, 622-5000, 228-8000, 269-8000	3 bahts/call
Central Region			
2.	Suphanburi	(035) 546-969	3 bahts/call
3.	Petchburi	(032) 401-269	3 bahts/call
4.	Prachuapkhirkhan	(032) 522-134	3 bahts/call
5.	Nakhonpatom	(034) 272-055	3 bahts/call
6.	Ratchaburi	(034) 327-522	3 bahts/call
7.	Ayutthaya	(035) 321-922	3 bahts/call
8.	Saraburi	(035) 230-900	3 bahts/call
Region			
9.	Chiang Mai	(053) 400-111, 222-256, 938-000 (56K.)	3 bahts/call
10.	Chiang Rai	(053) 754-488, 600-234	3 bahts/call
11.	Lampang	(054) 325-866, 250-000	3 bahts/call
12.	Lamphun	(053) 532-999	3 bahts/call
13.	Nakhonsawan	(056) 336-543	3 bahts/call
14.	Phitsanulok	(055) 284-100, 231-188	3 bahts/call
Southern Region			
15.	Phuket	(076) 232-550, 354-050, 359-000 (56K)	3 bahts/call
16.	Surat Thani	(077) 214-255	3 bahts/call
17.	Songkhla	(074) 346-700	3 bahts/call
18.	Krabi	(075) 622-022	3 bahts/call
19.	Nakhonsithammarat	(075) 340-740	3 bahts/call
Eastern Region			
20.	Chonburi (Pattaya)	(038) 723-555 (56 K.), 421-233, 258-000	3 bahts/call
21.	Rayong	(038) 619-009, 928-000 (56 K.)	3 bahts/call
22.	Chachoengsao	(038) 517-134	3 bahts/call
23.	Chanthaburi	(039) 301-330	3 bahts/call
Northeastern Region			
24.	Khon Kaen	(043) 320-123	3 bahts/call
25.	Nakhon Ratchasima	(044) 269-050	3 bahts/call
26.	Udon Thani	(042) 344-344	3 bahts/call
27.	Ubon Ratchathani	(045) 260-567	3 bahts/call



Automobile (Thailand) Ltd		
5161 : 1/8/43	Tel. 366-0331-41 Fax. 366-0342	: 13:45: 50
<div> <div> 1. 2. 3. 4. </div> <div> 5. 6. 7. E. </div> </div>		
<div> <div> f011f113JY111 011111 </div> <div> Chf1510f115 </div> </div>		

Figure E.1. Inquiry Menu.

Automobile (Thailand) Ltd		
"11,61 : 1/8/43	Tel. 366-0331-41 Fax. 366-0342	n11: 13:45: 50
<div> <div> 1. 2. 3. 4. 5. 6. </div> <div> </div> </div>		
<div> <div> ViD11f13,151MAEJORTIfil </div> <div> 180f1510f11S </div> </div>		

Figure E.2. Inquiry Stock Menu (Main Menu).

frouplaillunriatitiiiismil			iiii: 1/8/43		
ni'rfRtifii	4.1-1	Fr	icil.	a-11411-1	51W191D191,i'M
10P	Hilux	Red	2000	5	430,000
90S	Sport	Black	1600	10	1,900,000
10C	Corona	old	1500	5	530,000
11C	Corola	Silver	1600	7	650,000
10f ³	Hilux	Black	2400	9	450,000
99S	Super Sport	Silver	1600	10	2,500,000
(Next/Quit)					

Figure E.5. Price List Screen.

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<i>Automobile (Thailand) Ltd</i>		
ilF1f: 1/8/43	Tel. 366-0331-41 Fax. 366-0342	13:45: 50
1. ' 011t113a111.11:011c110flaiS	5. VfOlit11184111f19:3JFTllfl	
2. ff ll11119113J'llal	6. rfDlif117N113J1I0LIfl	
3. VDuniuvruniirrFnuli	7. rfDlif113,11152:3flVTT1E11114	
E. f41J51Elf11511Kfl		
Vallt11111115MO111'111')115tilill		18D fl51flfl15

Figure E.6. Inquiry Product Information Menu.



Ird107110f1rf 15 : TS4303002

11,1 : Hilux Ff : Black

4'1.: 2400 i111'311 : 3

: 1fs1 001 115 i1691

V1311011191

Head : (Change/Delete/Option-detail/Quit)

Figure E.7. Inquiry/Add/Change Stock's Screen.



<i>Automobile (Thailand) Ltd</i>		
ad : 1/8/43	Tel. 366-0331-41 Fax. 366-0342	: 13:45: 50
<p>1. ff01.10111111i1lg11/ fl111J / i1i1101 if 911=96400 ff 15.....</p> <p>2. vraimiuluTugil fl19 / 1173j111f</p> <p>3. ?Min1014'141u mwwf/ L1i1011191'ongiTerfrigi _____</p> <p>4. "a011t1111111511;f11/fl9111d/ 1f1311111 i11411,15100151171n1J11111.1</p> <p>5. 11151E011514f1 _____</p>		
V(011011111.9 0/11N		

Figure E.8. Inquiry for Return Product.

<i>Automobile (Thailand) Ltd</i>		
ad J1V1 : 1/8/43	Tel. 366-0331-41 Fax. 366-0342	: 13:45: 50
<p>1. nutrally urruamid/ titi —oth4flr,ilAtin</p> <p>2. rfvutini1iff1itiu/a90A</p> <p>3. nftilitininfK0 _____</p>		
rfaimmliiiiiiu I mid/ litnif Fnutmiironm7		fl51f1fl15

Figure E.9. Inquiry for Return Product.

iimin itAninim luTililu t mg/tfilAlif		51.1ü 28/ 02 / 43	
Ifilil IDtTells :CBR430104 illirl: 14/ 01/ 43/			
SITV1111	: AA00005: 5,T,601 ODICnta		
1111E111191			
53111111	: 9,500,000		
htlitinnA	sv7vrFrutl 1,11 Fr nA'1Frutii im-nifrutfi	51f1/911hEl	513.41,1
	A0022 Sport B Rangsit	1	9,500,000 9,500,000
111.11011191			

Figure E.10. The Screen of Add/Change/Delete/Debit/Credit Dealer.



<i>Automobile (Thailand) Ltd</i>			
^a 1-dil : 1/8/43		Tel. 366-0331-41 Fax. 366-0342	dini : 13:45: 50
Schedule Reservation			
A1411V;	Dealer	S/O no.	Remark
1	5t,q18101.1915iiV	S180/43	
2	ifM _g niionla	S181/43	
3	110111111 f a	S182/43	
4	1711iii Tfl favilviviai'	S183/43	

Figure E. 13. Schedule Reservation.



Table 1: Daily Sales Report.

Day	Dealer No.	Invoice No.	Item	Item Description	Unit/Price	Q ₄	Rev. Amt.
1-Aug-43	A00Z0	110000	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110001	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110002	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110003	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110004	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110005	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110006	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110007	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110008	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110009	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110010	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110011	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110012	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110013	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110014	Corona	Corona	3,500.00	1	3,500.00
1-Aug-43	A00Z0	110015	Corona	Corona	3,500.00	1	3,500.00

g
H

Date	Dealer No.	Dealer Name	Sales Order	Unit / Price	Item Description	Item	Rev. Amt.
1-Aug-43	Λ00Z0	ο ·· ρ ρ ρ	110000	1,900,000	Sport	800	1,900,000
1-Aug-43	Λ00Z0	οο ·· ρ ρ ρ	110001	1,200,000	VAN	80V	1,200,000
1-Aug-43	Ω0Z0	ϕ ρ ρ ρ ρ ρ	110002	1,200,000	Corona	100	1,200,000
1-Aug-43	Λ00Z1	ϕ ρ ρ ρ ρ ρ	110003	1,200,000	Corona	100	1,200,000
1-Aug-43	Ω0Z1	ϕ ρ ρ ρ ρ ρ	110004	3,450	Spare part	200	3,450
1-Aug-43	Ω0Z1	ϕ ρ ρ ρ ρ ρ	110005	1,200,000	Corona	80V	1,200,000
2-Aug-43	Λ00ZZ	ο ρ ρ ρ ρ ρ ρ	110007	1,200,000	Corona	100	1,200,000
2-Aug-43	Λ00Z1	ρ ρ ρ ρ ρ ρ	110008	1,200,000	Corola	11C	1,200,000
2-Aug-43	Ω0Z0	ρ ρ ρ ρ ρ ρ	110009	2,500,000	Super Sport	80	2,500,000
3-Jan-00	Λ00ZS	ρ ρ ρ ρ ρ ρ	110010	1,200,000	Pick up	100	1,200,000
3-Aug-43	Ω0Z0	ρ ρ ρ ρ ρ ρ	110011	1,200,000	Corona	100	1,200,000
3-Aug-43	Ω0Z0	ρ ρ ρ ρ ρ ρ	110012	1,200,000	Corona	200	1,200,000
3-Aug-43	Ω0Z0	ρ ρ ρ ρ ρ ρ	110013	1,200,000	Corona	11C	1,200,000
4-Aug-43	Λ00Z0	ρ ρ ρ ρ ρ ρ	110014	1,200,000	Super Sport	80	1,200,000
4-Aug-43	Ω0Z0	ρ ρ ρ ρ ρ ρ	110015	1,200,000	Super Sport	80	1,200,000

Weekly Total Sales Volume Report.

Sl. No.	Dealer No.	Dealer Name	Sales Order	Item No.	Item	Item Description	Unit /Price	Qty	I Rev. Amt. I
17-Aug-43	A00Z0	...	110000	109	...	Sport	...	...	1,900,000
7-Aug-43	A00Z0	...	110001	110	...	VAN	...	...	...
7-Aug-43	A00Z0	...	110002	111	...	Corona	...	...	...
7-Aug-43	A00Z0	...	110003	112	...	Corona	...	...	...
18-Aug-43	A00Z0	...	110004	113	...	Spare part	...	...	...
9-Aug-43	A00Z0	...	110005	114	...	...	...	...	...
9-Aug-43	A00Z0	...	110006	115	...	Corona	...	...	...
9-Aug-43	A00Z0	...	110007	116	...	...	...	...	...
10-Aug-43	A00Z0	...	110008	117	...	Super Sport	...	...	...
10-Aug-43	A00Z0	...	110009	118	...	...	...	...	...
10-Aug-43	A00Z0	...	110010	119	...	Pick up	...	...	...
11-Aug-43	A00Z0	...	110011	120	...	Corona	...	...	...
11-Aug-43	A00Z0	...	110012	121	...	Spare part	...	...	...
12-Aug-43	A00Z0	...	110013	122	...	Corona	...	...	...
12-Aug-43	A00Z0	...	110014	123	...	...	...	...	...
		Weekly Total Sales Volume						Baht	...



APPENDIX G
USER MANUAL

USER MANUAL

Introductions

The proposed system, VPN, allows dealers at countries dial to inquire and send information to company at Bangkok at anytime. The user at countries need to prepare hardware and software which describe in Appendix A, and then they must installed program into his/her computer. The process to install program can describe as follows:

Step (a) Installation program "Dial-up Networking"

The step to install Dial-up Networking is described as this below:

- (1) Double click at "My computer"
- (2) See at My Computer icon to find out whether Dial-up Networking was installed.
- (3) If you found Dial-up Networking in My Computer icon, go to do step (b).
If you didn't , go to next step
- (4) Double click at "Control Panel"
- (5) Double click at "Add/Remove Program"
- (6) Double click at "Windows Setup" Tab
- (7) Double click at "Communication"
- (8) Click at "OK" and "OK" again (Input Disk or CD-ROM Windows 95/98 or identify directory which installation program was maintained)
- (9) Click "Yes" to restart computer
- (10) Go to step (b)

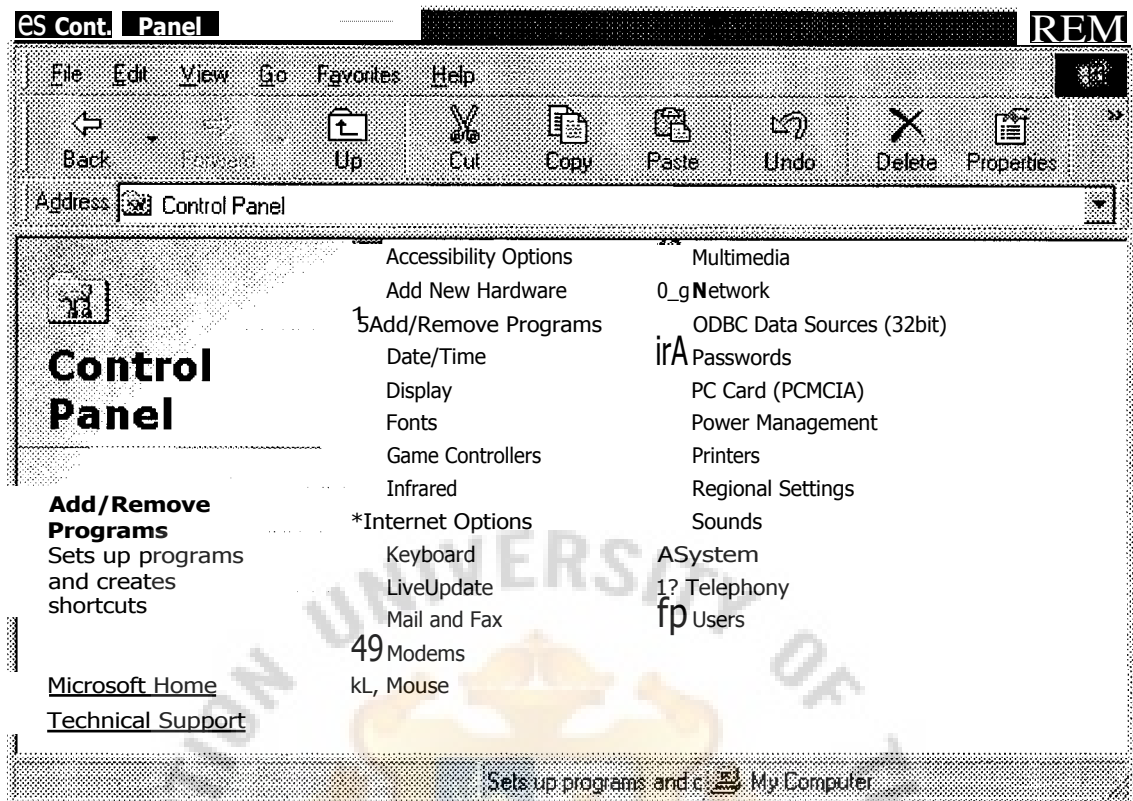


Figure G.1. Find Add/Remove Program.

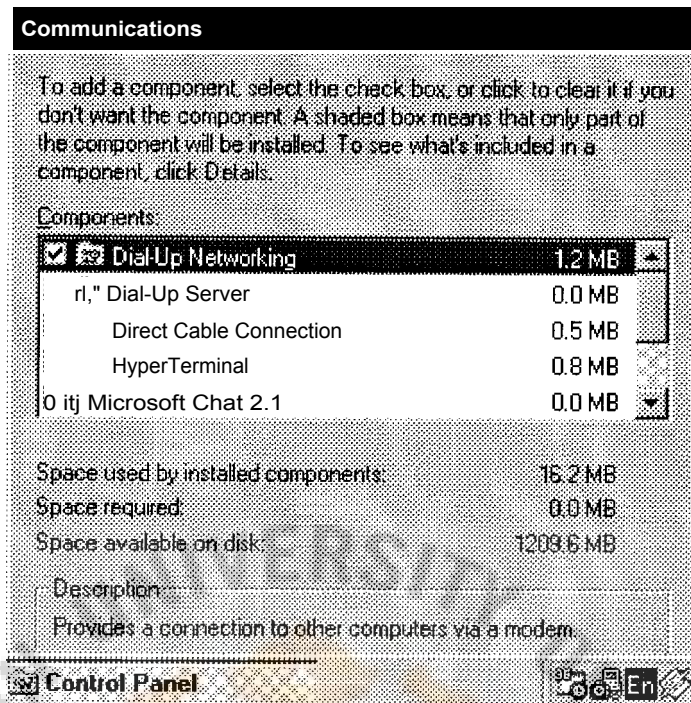


Figure G.2. Add Dial-up Network.

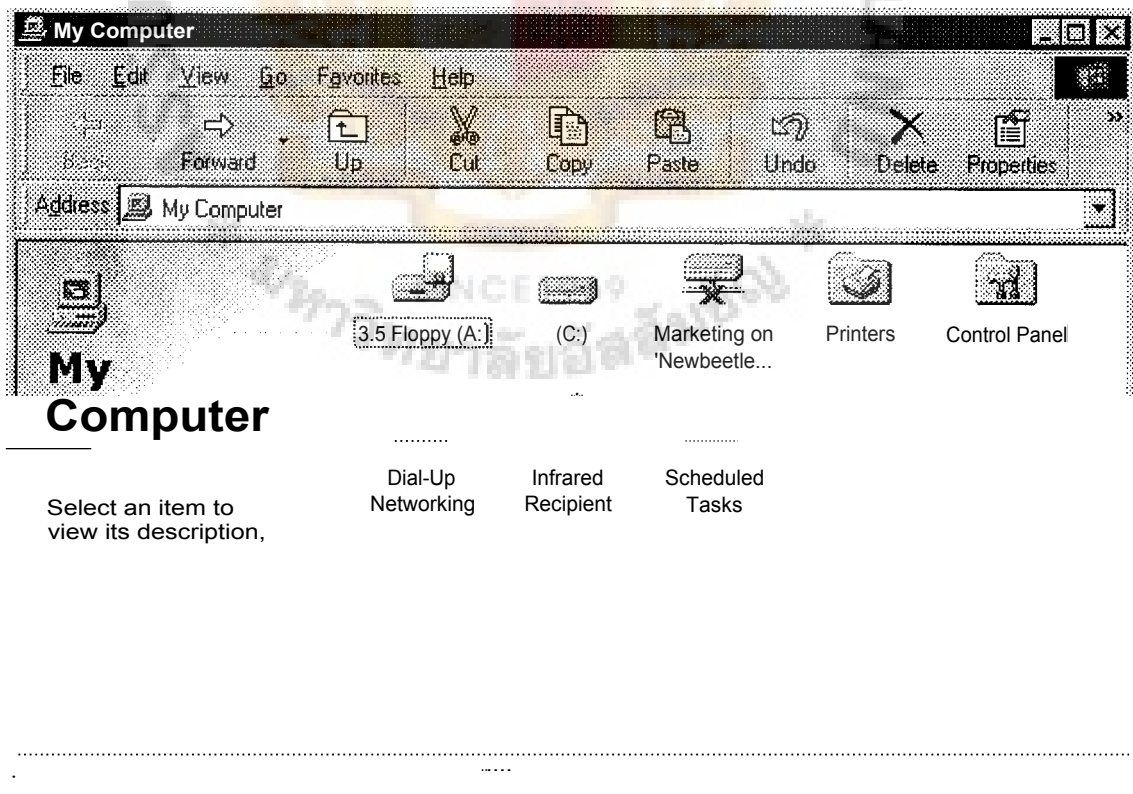
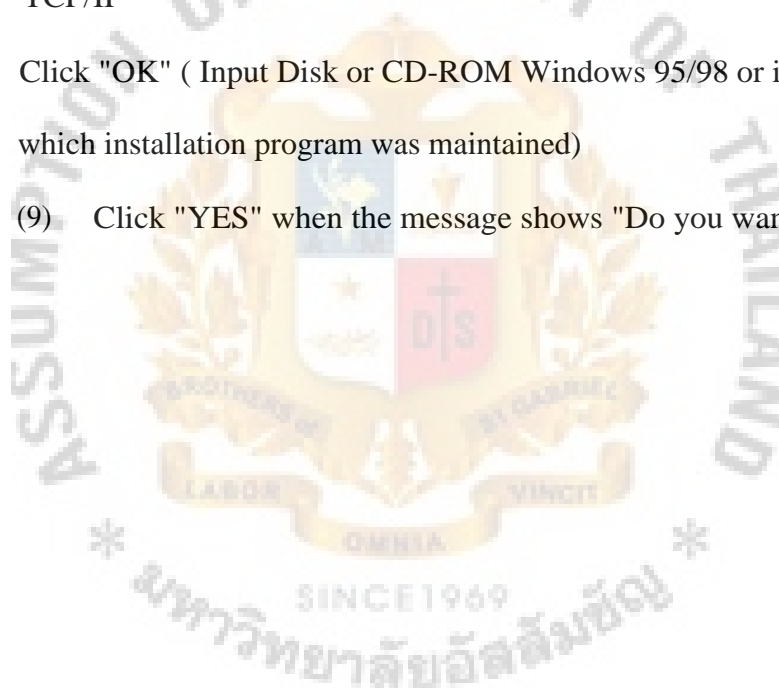


Figure G.3. After Dial-up Networking Was Installed.

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Step (b) Installation Protocol "TCP/IP"

- (1) Double click at "My Computer" and then Double click at "Control Panel"
- (2) Double click at "Network" icon
- (3) Check TCP/IP whether was installed in Configuration
- (4) If it did, go to step (c)
- (5) If it didn't, go to (6)
- (6) Click at "Add" and double click at "Protocol"
- (7) Under "Manufacture", choose "Microsoft" and Under "Protocol" choose "TCP/IP"
- (8) Click "OK" (Input Disk or CD-ROM Windows 95/98 or identify directory which installation program was maintained)
- (9) Click "YES" when the message shows "Do you want to restart?"



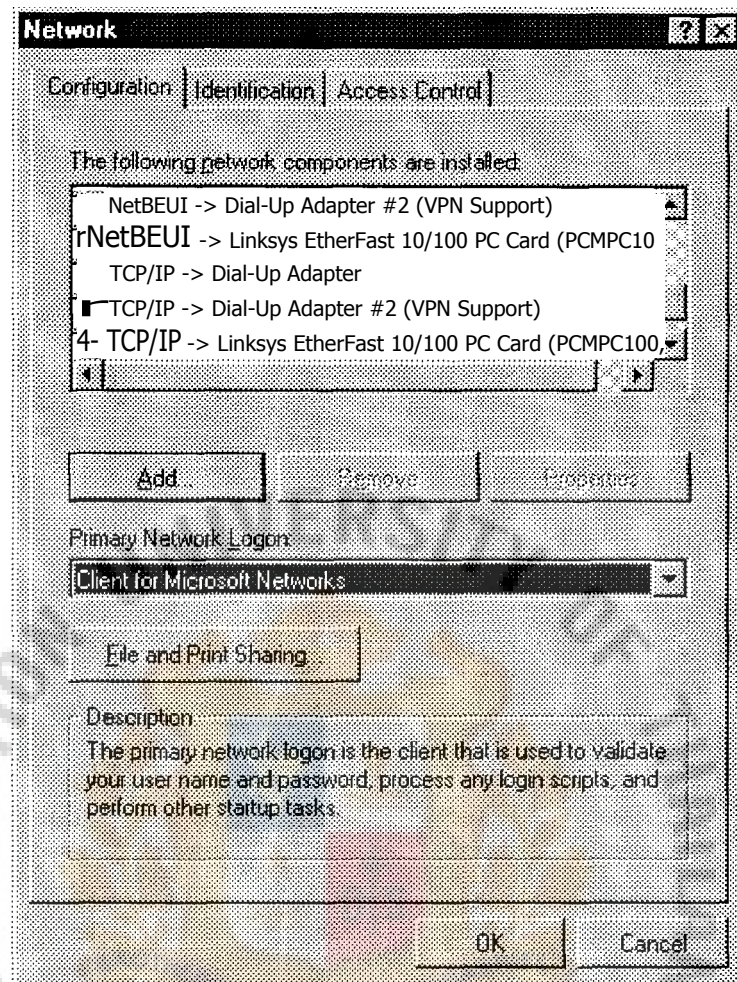


Figure G.4. Making TCP/IP.

Step (c) Making "Connection to Automobile" Icon

- (1) Double click at "My Computer", and then double click at folder "Dial-up Networking"
- (2) Double click at icon "Make New Connection" and type "Connection to Automobile"
- (3) Select modem and click "Next"
- (4) Type Area Code and type Telephone no. using connect to service and select "Thailand (66)" in Country Code item

- (5) Click at "Next" button, and then click at "Finish", "Connect to Automobile"
- (6) Click at right button of mouse on "Connect to Automobile" icon, and then select "Properties" from menu
- (7) Click at "Server Type" tap, to cancel the other choices and leave the "/" mark at these below choices only.
 '/ Enable Software Compression
 "1 TCP/IP
- (8) Click at "OK" and click "OK" again

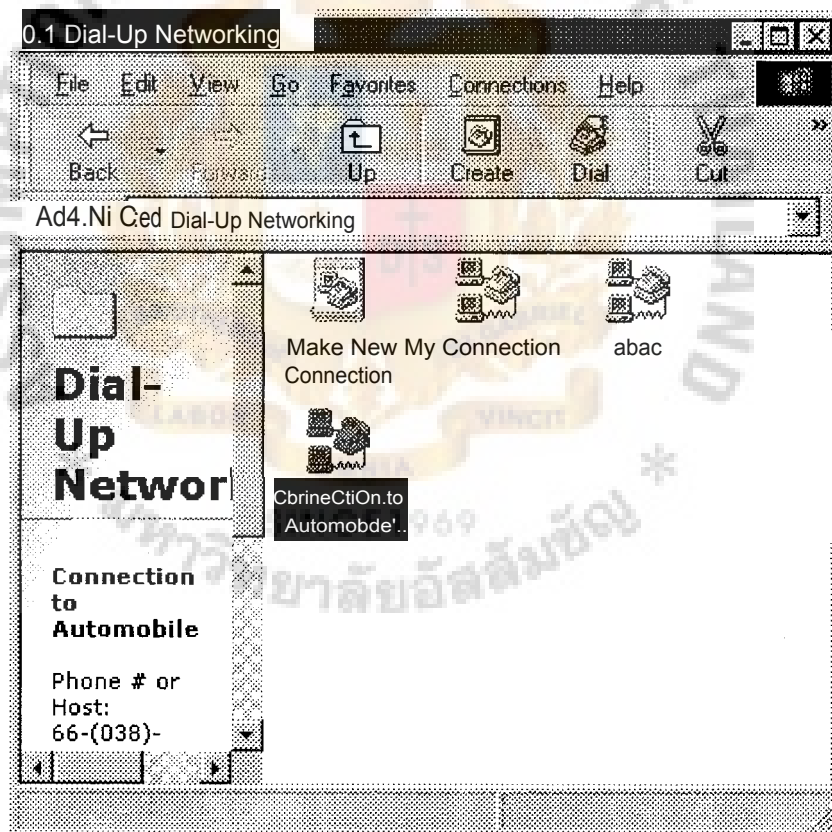


Figure G.5. After Making Icon "Connection to Automobile".

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After you did all process above completely, you can connect to company at Bangkok by follow as the process following.

The Starting Process to Connect to VPN

- (1) Double click at "My computer" on Desktop
- (2) Double click at Dial-up Networking
- (3) Double click at icon "Connect to Automobile"
- (4) At the window "Connect to", type "VPN User Name" into User name; for example, somchai#automobile.co.th
- (5) Type password
- (6) Check the telephone no.
- (7) Click button "Connect" to start connecting through ISP node

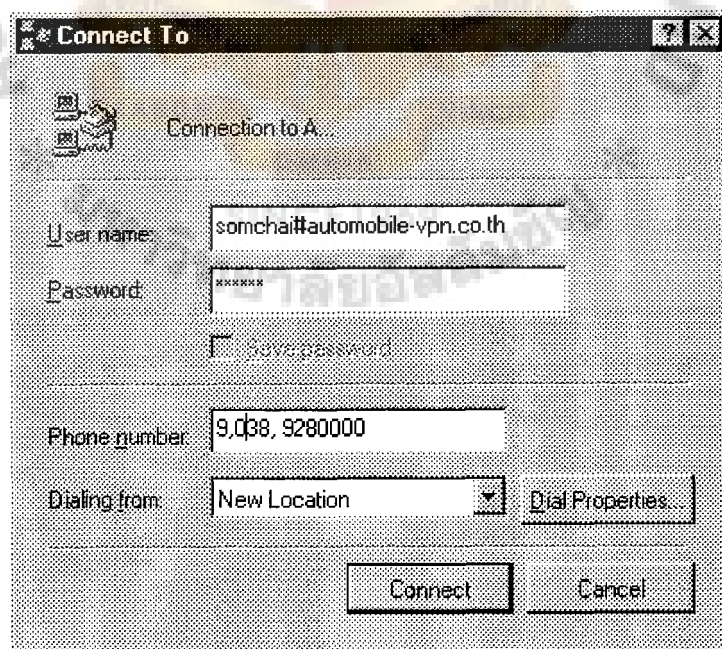


Figure G.6. Dial to Automobile through via VPN.

The Method to Use Internet Program

Double click at icon "The Internet or Internet Explorer" which was shown on the screen or click at button "Start", and scroll to "Programs" and select "Internet Explorer or other Internet Program such as ICQ, IRC etc.

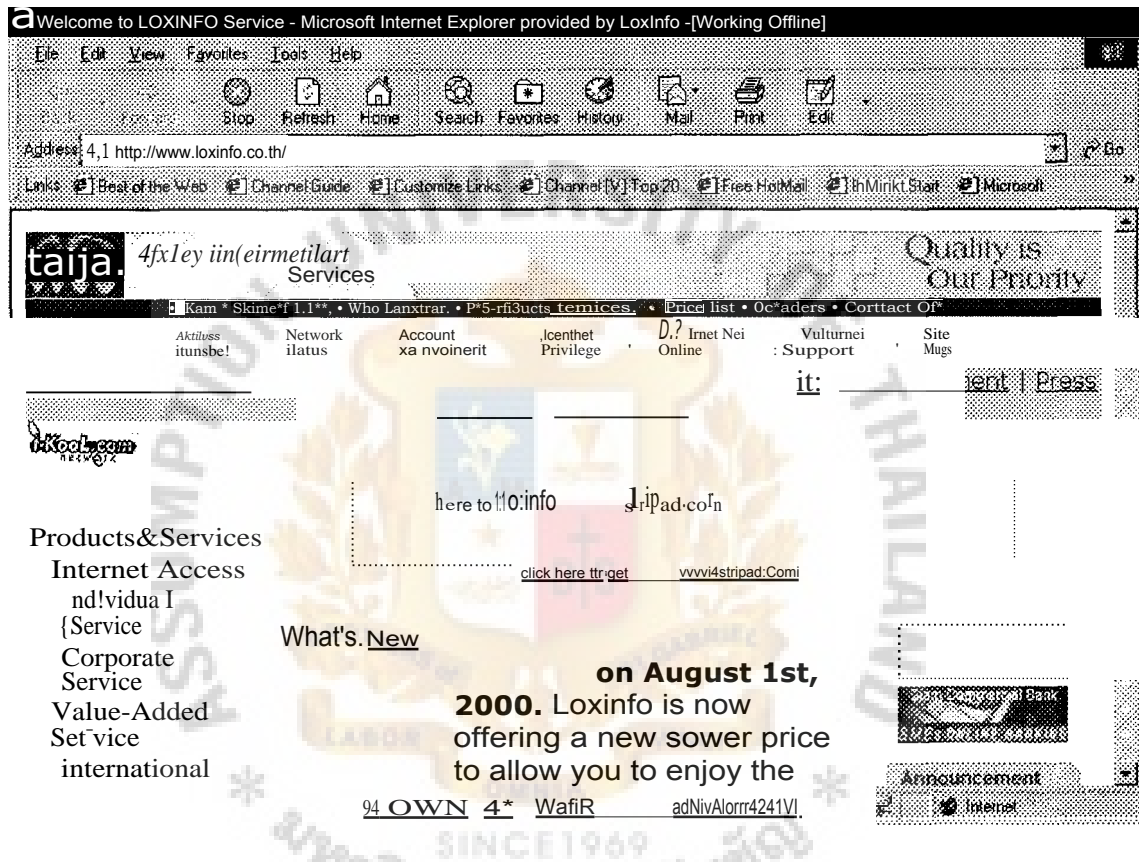


Figure G.7. Internet Explorer.

User can search only web site which created by Automobile company or located in automobile company because this system is connection between head office and its dealers. This web site may involved product catalogue, promotion campaign, product price list or new product release or other news. However, company can make connection to Internet to connect other parties for the next stage, and it will help user can search other website.

The Method to Disconnect from VPN

- (1) Click at "Disconnect" on the window which show connecting status or
- (2) Double click at icon which show connecting status at the right corner at the below of screen, and then click at button "Disconnect" at the window which shows status of connecting or
- (3) Double click "My Computer", double click "Dial-up Networking", Double click at icon "Connect to Automobile" and click at "Disconnect" at the windows which shows connecting status.



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9. <http://www.verisign.com/>
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11. <http://www.3com.com/nsc/501302.html>
12. http://www.cisco.com/univercd/cc/td/dodcisintwk/intsolns/vpn_soln/vpdnover.html
13. <http://www.cisco.com/univercd/cc/td/doc/product/software/hos120/>

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