Telecommunications in Thailand

Srisakdi Charmonman

11

Thailand

SRISAKDI CHARMONMAN

Thailand, in the late twentieth century, is one of the third wave of Asian countries (after Japan and the "four dragons") to engage in widespread industrialization. Even before this time, Bangkok had become an important world city, home to the regional offices of many international organizations. This has created tremendous demands on the country's infrastructure, including telecommunications. Unfortunately, Bangkok has an inadequate telephone system for a city of such size and importance. The situation is such that poor service nationwide has been considered a major impediment to investment—particularly by foreigners—and a major stumbling block in trying to encourage development outside the Bangkok area.

Solving the problem is simply a question of will and money. The expectation is that foreign capital—including soft loans from the governments of countries whose companies want to sell equipment to Thailand, as well as some direct funding of networks by the firms that will be using them—will reduce the problems. This, however, will be aimed primarily at business users. It is impossible to judge when residential users throughout the country will be able to obtain service without a long wait.

The government introduced the telephone and telegraph into Thailand (called Siam until 1939 and in 1946–1948). By law and regulations, government agencies have had a monopoly on them since the nineteenth century, but this began to change with the 1991 announcement of new franchises—one for Bangkok and one for up-country.

11.1 History

Thais date the history of their country from 1238 when an ethnic Tai state was established in part of what is now Thailand. They took the name Thai, meaning free, to distinguish themselves from Tai groups still under foreign domination. The boundaries waxed and waned—at various times parts of what are now Laos, Cambodia, Malaya, and Burma were under Thai suzerainty. At other

times Thai empires were toppled by invaders, most recently by the Burmese in 1767. The country had been reunited by 1776, and in 1782 the current dynasty was founded, along with a new capital at Bangkok. Although parts of the country were ceded to the neighboring British and French colonies in the nineteenth and twentieth centuries, the two foreign powers recognized the usefulness of a buffer between them, so the Thai core area remained independent. The country was an absolute monarchy until 1932, although central government influence was limited except in the capital region until the late nineteenth century. The monarchs, if not their ministers, were generally open to "modernization"; Mongkut (Rama IV, 1851–1868) and Chulalongkorn (Rama V, 1868–1910) are particularly noted in this regard.

Until the late nineteenth century, three message delivery systems were in use, each for a different category of user: royal, town councils, and merchants and monasteries. Important messages, such as the king's letters to provincial governors, were delivered by royal messengers, "traveling commissioners," who went directly from the town of origin to the town of destination carrying a royal seal or sword that empowered them to order any and all town councils along the way to provide them with transportation and anything else required to execute their duties.

Town councils had a special group of messengers called "fast runners," who carried official messages in bamboo tubes slung over their shoulders. Though called runners, they traveled on horses, elephants, boats, rafts, and buffalo carts, as well as on foot. Merchants or monasteries employed their own messengers or used traveling traders to carry messages, which were written or verbal.

11.1.1 Postal System

During the reign of King Mongkut (1851–1868) the royal monopoly of commodity trade was abolished and in 1855 the country opened its doors to foreign trade by signing the Treaty of Friendship and Commerce with Britain (Bowering Treaty). A large number of foreign merchants, therefore, came to Bangkok and several consulates were established.

In 1867 the British Consulate was permitted to operate a postal service for foreign countries. However, it was only one way: from Bangkok to Singapore. Those wishing to send letters beyond Singapore had to buy British stamps (imprinted with a "B" for Bangkok) from the British Consulate. Letters went to Singapore by British merchant ships. The Singapore connection was used until 1882.

In 1875 the first Thai postal stamps were ordered from Thomas de la Rue Company in London. In 1881 it was suggested to King Chulalongkorn that an official postal system be established. The king directed Prince Bhanurangsi to collaborate with Henry Albastor, an advisor from England, to draw up a plan. The first set of postal rules and regulations was promulgated two years later. They originated in a letter from Alabstor to Prince Bhanurangsi, who attached them to his letter to King Chulalongkorn, who approved them. Among other

things, the document outlined the responsibilities of the post office, penalties for depositing dangerous material or garbage into any postbox, and the privileges of postmen.

The headquarters building for the Postal Department was officially opened on August 4, 1883. The department was under the command of Prince Bhanurangsi, now known as the father of the Thai postal system. The first post office was established nearby. The total area receiving postal service at that time was less than 10 km². The Thailand Postal Administration was admitted to the Postal Union on July 1, 1885.

11.1.2 Telegraph and Telephone

In 1869 two Englishmen received permission to set up a British company to install and maintain a telegraph system for various provinces of Thailand, with a connection to Penang in Malaysia. Unfortunately, they could not complete the work.

In 1875 the Thai government assigned the Ministry of Defense the project of installing a telegraph line from Bangkok to Samutprakarn, a fortress town on the Gulf of Thailand, a distance of 45 km. The line was later extended using submarine cable to the lighthouse in the sea a few kilometers from the mouth of the Chao Phraya River. The line's primary purpose was to report on vessels crossing the river's bar to and from Bangkok. The first telegraph office in Thailand was established at Saranromya Palace in Bangkok.

The country's second telegraph line was installed in 1878 running from Bangkok to Bang Pa-in Palace, about 46 km to the north. This line was later extended to the old capital of Ayudhya, another 32 km. Like the Samutprakarn line, it was used only for official purposes.

The first telephone system was built in 1881 for the same use as the first telegraph system six years earlier: Facilitating Samutprakarn reports on ship movements in and out of Chao Phraya River. The person in charge of surveying and installation was an Englishman.

At the same time the Postal Department was formally created in 1883, a Telegraph Department was established by royal decree. All the telegraph facilities maintained by the Defense Department were handed over to the new department. A telegraph line was installed from Bangkok to the province of Karnchanaburi for connection to Burma in 1884, but it was later discontinued because of difficulties in repair and maintenance. Between 1895 and 1897 three domestic trunk lines were installed, connecting all major towns to Bangkok.

In 1886 telephone service was moved from the Ministry of Defense to the Post and Telegraph Office (PTO). PTO expanded the system and offered services to the public. At that time, a Magneto system with local battery served sixty-one numbers. In 1887 private citizens were allowed to use private telephone handsets without having to pay rental fees. By 1899, subscribers were allowed to use telephone service twenty-four hours a day.

The first foreign telegraph connection, from Bangkok to Saigon via Phnom Penh, was completed in 1883. A line to Rangoon was completed in 1897, and

one to Penang came into operation in 1899. Thailand joined the International Telegraph Union in July 1885.

The PTO was split into departments for posts and for telegraph (including telephone) in 1891, and was recombined in 1897 as the Post and Telegraph Department (PTD). In 1906 a foreigner named Collman was appointed director general. He served until 1909 and had considerable influence over telecommunications in Thailand.

The military played an important role until the mid-1920s. In 1911 the navy started using a radio telegraph system for communication with foreign countries. In 1912 telegraph codes for the Thai language were announced as the result of work done by the Defence Ministry together with the Railway Organization and PTD. In 1914 the navy was given royal permission to establish the first radio telegraph station. The navy transferred all the equipment and personnel at its radio telegraph stations to PTD in 1926. Since then, military-related telecommunications have been more or less separate from commercial telecommunications.

Many early telephone and telegraph lines were funded by Thai individuals on behalf of the government. In 1897 the Governor of Lumpang (modern Lamphun, in the north near Chieng Mai) donated personal funds to install a telegraph line from Lumpang to the adjacent province of Phrae; Prince Ratanaburi of Lumpang later donated funds to install a line from that town to the Tern district. (Districts—there are over 400—are the next local administrative level down; the seventy-three provinces each have the same name as their capital). In 1903 the princes of Chieng Mai made personal donations to install a 36-km telegraph line. In 1905 the governor of Udorn organized a group of people to work on installing a telephone line from Markkang district to the province of Nakhon Phanom, some 245 km away. In 1919 the population of Sukhothai province donated money for the construction of a telephone exchange.

Telephone service remained very localized. In 1911 a system was installed in the Mueng Li district of the Payap region, covering a radius of 38 km, to combat thieves and robbers in the area. In 1927 more exchanges were added, and telephone service was expanded from Bangkok and Samutprakarn to include a few more provinces.

By 1921 there were 243 PTOs, 6,787 km of telegraph lines, and 10,168 km of wire under the PTD, plus radio telegraph service in several locations operated by the navy. During the late 1920s radio telegraph stations were established in fifty districts and provinces where lines had not been installed. By 1930, therefore, the cities and major towns were linked with Bangkok and, in some cases, directly with each other.

Realizing the extent of demand for telephones, the government in 1935 ordered two exchanges (totaling 3,500 lines) from General Electric Company of England. They were installed in 1936 by Thai engineers, who had been sent to England for training, under the supervision of English engineers. In 1937 radio telephone service was established in the provinces for communication with Bangkok using AM, HF systems designed in part by PTD. The same year, two more exchanges were added to try to cope with the demand for service.

The Japanese occupied Thailand during 1942–1945, and pressured the government into declaring war on Britain and the United States—although the Thai minister in Washington refused to deliver the declaration and the United States never declared war on Thailand. Still, Bangkok was bombed by the Allies. The war disrupted international services and destroyed some facilities. In 1946 radio telegraph service was resumed or started from Bangkok to London, Singapore, Shanghai, Hong Kong, and Stockholm. Other connections followed.

The first new exchange since 1937 came in 1951, with others in 1952 and 1956. At that point the number of subscribers reached 12,920.

A telegraph machine capable of handling Thai-language messages was invented in 1953. English–Thai telex machines designed in Thailand and manufactured in Japan were installed in 1957. Telex service between Bangkok and Geneva was started in 1959 and leased telegraph circuit service in 1960.

An innovation in making the government accessible to the people was made in 1962 when a telegraph service was offered allowing complaints to be sent to the government without charge to the sender. Table 11.1 provides a summary overview of the chronology of Thai telecommunications before the 1980s.

11.2 Structure

Three organizations are responsible for telecommunications: the PTD, the Telephone Organization of Thailand (TOT), and the Communications Authority of Thailand (CAT). PTD is supposed to be responsible for rules and regulations, CAT for the operation of post, telegraph, and related services, and TOT for telephone services. In practice, their authorities overlap.

All three answer to the Ministry of Communications, which is also responsible for transportation. A deputy permanent secretary and a deputy minister, who also sits in the cabinet, are responsible for the three operations. PTD is a government department headed by a director general. CAT and TOT are state enterprises, and as such are supposed to operate like private companies.

Members of the ministry and PTD are government officials. All government officials serve in one of eleven classifications under the same salary scale no matter which department or ministry they belong. PTD employed about 400 in 1989. CAT and TOT staff are not government officials, but are instead employees of state enterprises. Their salary scale is about 30 percent higher than that of government officials.

TOT is responsible for domestic telephone service, international service to Laos and Malaysia (with which Thailand has land borders), and leased circuits for domestic point-to-point transmission of voice, telegraph, radio, and television. It is governed by an eight-member board and its managing director is appointed by the cabinet. Board members are usually from MOC and other government agencies. In 1989 TOT employed about 17,000.

CAT is responsible for the postal service as well as telegraph and telex, telephoto and facsimile services, domestic radio–telephone links to some isolated areas, international telephone service for countries not served by TOT,

Table 11.1. Chronology of Thai Telecommunications before 1980

1875	First telegraph service
1881	First telephone service
1883	Postal Department and Telegraph Department established
1883	International telegraph available to Saigon via Phnom Penh
1885	Post Office Law, covers telecommunications as well
1897	Telegraph Department combined with Post Department to become the Post and Telegraph Department (PTD); laws governing telecommunications revised.
1914	Telegraph Act
1920	Radio Telegraph Law
1929	First permanent radio station
1929	Private citizens allowed to own radios. (This had been prohibited under the 1914 Telegraph Act.)
1931	First over-the-air radio station
1935	Radio Communications Act
1936	Long-distance telephone service to Tokyo
1936	Four-wire system replaced by a two-wire system
1937	Automatic dial telephone
1939	Radio telegraph service to Shanghai
1954	Telephone Organization of Thailand spun off from PTD
1958	Telephone service to Taipei via Hong Kong
1959	IBM computers installed at TOT for billing purposes
1963	Telex service to Japan
1967	Ship-to-shore services
1971	PTD installed NEC cross bar switch with fifty international circuits
1971	Radio paging service started with 200 units
1972	Car phones introduced with fifty units
1974	Bangkok phone numbers changed from five to six digits
1976	Bangkok phone numbers changed to seven digits
1976	Communications Authority of Thailand spun off from PTD
1977	Push button telephones introduced by TOT
1979	Facsimile service

and international leased circuits. The eight members of its board, as well as the governor (chief executive officer), are appointed by the cabinet. The board usually includes the deputy permanent secretary of MOC and the director of TOT. Other members come from the Department of Defense, the office of the prime minister, and other organizations approved by the cabinet. In 1989 CAT employed about 20,000 in thirty-six divisions.

Overlapping functions among various organizations is characteristic of the entire history of telecommunications in Thailand. However, the trend has been toward consolidation of like activities in a single entity. Thus, up-country telephone service in eleven provinces, together with ten exchanges, 1,600 numbers and 1,213 employees were transferred by PTD to TOT in 1960. All the remaining up-country telephone services were transferred from PTD to TOT in 1961. In 1964 TOT was given responsibility for the Telecommunication Center

at Krung Kasem donated by the U.S. government. The center was used for long-distance connections in the fourteen provinces in the central, northeastern, and eastern regions.

11.2.1 Legal Foundations

Five major laws form the legal foundations for post and telecommunications in Thailand. They are the Telegraph and Telephone Act of 1934, the Post Act of 1934, the Telephone Organization of Thailand Act of 1954, the Radio Communication Act of 1955, and the Telecommunications Authority Act of 1976.

The two 1934 acts were primarily a result of the shift from an absolute to constitutional monarchy. However, the Telegraph and Telephone Act also sought to respond to growing business uses for telecom services, which had made the previous law inappropriate. The act was quite detailed in many ways, particularly regarding definitions of terms. As before, PTD was given a monopoly over telegraph and telephone business inside Thailand. Under the act, the Minister sets rates and some other regulations. An amendment in 1974 exempted the Ministry of Defense, thereby allowing it to set up its own telecommunications system. The Post Act superseded the 1897 law. The PTD remained the monopoly provider of postal services, and set rates under the act. The act was amended in 1940 to change the definition of a few terms.

The Radio Communication Act of 1955 superseded Radio Communication Acts of 1935, 1938, 1940, 1947, 1948, and 1954. Anyone importing radio communication equipment had to have permission from the government. The PTD, Public Relations Department in the Office of the prime minister, Ministry of Defense, and other government units subsequently announced were all exempted. A 1961 amendment exempted all government units automatically without having to name each unit in ministerial regulations.

The Telephone Organization of Thailand Act of 1954 separated the telephone section from PTD and made it a government enterprise called TOT under MOC. The Communication Authority Act of 1976 established CAT as a government enterprise. Prior that time the activities taken over by CAT had been handled by PTD directly. Most telegraph stations were in post offices, and most international telephone calls had to be booked and made from a post office, so it was logical to keep these services in the same organization.

11.2.2 Financial Health

As a government agency, PDT's budget is approved by Parliament, and the Department is not allowed to spend more than that. Allocations are used to prepare policies and plans and enforce rules and regulations, which are PTD's functions. PDT does not have any income of its own, but money from radio communication licenses, rental of telecommunications equipment, and fines for late renewals of licenses—all of which must be remitted to the government treasury—can be considered PTD income.

As a state enterprise, the underlying philosophy of CAT is to be profitable,

and it is. CAT is allowed to pay bonuses to employees. In what can be considered payments in lieu of taxes, state enterprises remit a part of profits to the government treasury. CAT has been providing an increasing amount—although the amount relative to gross (and net) profits is lower than in the early 1980s.

TOT has obvious needs for capital beyond even its gross profits, let alone the share it retains. However, there is a severe overall shortage of funds relative to what the government wants to spend, and telecommunication needs must be balanced against these other demands. Thus, because of the government's aggregate ceilings on foreign debt levels, TOT could add only about 200,000 lines per year in the late 1980s, despite a reported half-million line backlog in 1990 and (from a different source) 1.2 million in 1991.

11.3 International Cooperation

Bangkok emerged in the 1960s as a major international airport as travel between Europe and East Asia increased. As such, the country has developed extensive aeronautical communication services and surveillance radar that is connected by microwave and satellite to other regional airports, including Bombay and Kuala Lumpur. The services are provided by Aeronautical Radio of Thailand (Aerothai), a government-owned company created in 1963 to take over a company formed in 1954 by the foreign airlines using Bangkok. In 1967 Thailand was designated the Southeast Asian telecommunications center for weather information.

In 1978 membership in the Asia Electronic Union (AEU) was transferred from the National Research Council of Thailand, a member since 1969, to PTD. PTD set up the Electronic Association of Thailand in 1980. In 1979 PTD became a member of Asia–Pacific Telecommunity (APT). The headquarters of the organization was opened in Bangkok in 1982. Thailand hosted the thirteenth meeting of signatories of Intelsat in 1983. The country has been part of the Asian–Pacific Postal Union (APPU) since 1972.

Thai students have gone to study telecommunications in the United States, Japan, Canada, England, and other countries. In Thailand, there are also a few telecommunications training centers. A training institute is organized every year for members of Asian countries, with financial support provided by the Japanese government.

11.3.1 Submarine Cable and Satellites

Thailand belongs to several consortiums that have cables both in the region and to Western Europe. The most important is the Philippines–Singapore Maintenance Agreement (which actually covers countries from Japan to Australia). Thailand's holding is 5 percent. In 1986 the cabinet gave permission for Thailand to invest in ASEAN Cableship Private Ltd. (ACPL), a company responsible for the maintenance of submarine cables. Thailand initially put about U.S.$280 thousand in this project.

In 1966 Thailand, through PTD, became the forty-ninth member of Intelsat with a 0.1 percent share. This was increased to 0.48563 percent in June 1984. GTE International was hired to construct the earth station at Sriracha in Chon Buri Province, southeast of Bangkok. It became operational on April 1, 1968. In 1971 Sriracha Earth Station I was tuned to Intelsat IV-F8 and Station II connecting to Intelsat IV-F1 became operational.

In 1979 the cabinet approved a MOC request to rent transponders on Indonesia's Palapa satellite. In 1980 the Thai Supreme Command through PTD also contracted to use Palapa. A joint earth station was approved by the cabinet in 1981 and completed in 1984. In addition, CAT constructed a main station at Sriracha and a substation along the Gulf of Siam. Fourteen substations had been constructed by 1982.

In mid-1991 the government granted Shinawatra Computer an eight-year monopoly and a thirty-year license to launch Thaisat. The first of two satellites was to be in orbit by 1993, with the government shifting usage to Thaisat as its leases expire on Palapa and other systems. The new system will address television as well as domestic communication needs.

11.4 Development, Services, and Rates

By 1978 Thailand had 146 telephone exchanges with 362,150 numbers, including 32 exchanges with 277,918 numbers in Bangkok (population over 4 million at the time) and 114 exchanges with 89,232 numbers up-country. TOT's staff numbered 10,221. TOT introduced 100 unstaffed public telephone booths for the first time.

Thailand's teledensity in the 1980s was well behind the "four dragons" and Malaysia, but it was ahead of Indonesia. Most phones in the region are in government or business offices—not homes—so density figures based on population have limited meaning. In the mid-1980s 38 percent of Thailand's telephone lines were residential, and TOT estimated that only 25 percent of the population had "access" to phone service.

TOT and CAT began providing mobile telephone and paging services in competition with each other in 1986 and each has licensed a second provider. TOT uses a VHF (around 440 MHz) system while CAT's is UHF (800 MHz). Because it is as difficult to get through traffic in Bangkok as it is to complete a telephone call, mobile service has been immensely popular.

Telex service was made available in 1962, but only six customers applied that year. In 1963 users were allowed to use their own telex machines rather than renting them from PTD. Telex subscribers can also use teleprinters to send and receive inland and international telegraph messages, using CAT circuits. Domestic calls can be made in Thai or Roman characters. In 1988 only thirty-six of the seventy-three provinces of Thailand had telex services; further expansion is still unlikely. The cost of telex is relatively low compared with telegrams but it is relatively high compared with fax.

Anyone wishing to have a telex must submit an application to CAT and

release an existing telephone line or submit an application to TOT to obtain a new telephone line for the telex. In some areas, it turns out that not enough lines are available. CAT, therefore, has installed its own lines to serve its telex users. Because these lines are dedicated to telex, they do not directly compete with TOT. However, if TOT is supposed to handle the telephone network, it can be argued CAT should not be allowed to install its own network.

11.4.1 Data Communications

Apart from using voice-grade leased circuits, there are three types of data transmission over telex lines for both domestic and overseas communication available. These are International DATEL Service, International Data base Access and Remote Computing Service (IDAR), and Super Telex Transmission.

Data transmission was initially not explicitly included in the law governing telecommunications. When banks started using on line terminals, they usually leased telephone lines from TOT to connect with their mainframes. In the early 1980s CAT interpreted the law to mean it was allowed to charge fees for those using the lines for data transmission. A few banks received invoices but refused to pay, saying that CAT did not provide any service beyond a regular telephone line, which was already being paid for. CAT countered that telephone lines were supposed to be used for voice transmission, not for data. The banks appealed to PTD, which eventually ruled that the banks did need not pay CAT.

11.4.2 Rates

It is expensive to get a telephone. It is particularly expensive if one does not want to wait a long time. The waiting period was up to seven years in 1990 in Bangkok, but a nonrefundable, noninterest-bearing "deposit" of 60,000 baht ($2,250) can reduce that to about a half year. In addition, there is an active black market. It is not uncommon for people to apply for telephones in the full expectation of selling their place, and brokers will buy connection rights from failing businesses and others for resale—at prices up to $5,000. The queue-jumping "deposit" requirement began in 1968 as a way to fund system expansion. The amount was initially 15,000 baht (then equal to U.S.$750).

On the other hand, basic monthly rates have been relatively low, starting from $2 for maintenance. Subscribers may own their own (approved) telephone instruments. There is a flat charge for each local call. Long distance is very expensive: $0.24–0.72 per domestic minute and $1.20–5.80 international.

11.5 Networks and Exceptions to Telecommunications Monopoly

Thailand has experienced over a dozen coups and coup attempts in the postwar period, as well as the bloodless 1932 coup against government ministers that led to the establishment of a constitutional monarchy. Many of these involved rebel troops from up-country, moving on orders initiated in the capital. There-

fore, the government does not allow any private parties, even commercial banks, to own private telecommunications networks. However, there are alternatives that give essentially the same result as a private network, and these may be considered exceptions to the monopoly.

Government agencies and ministries, such as Defense and Interior, have set up their own systems in competition with CAT and TOT for ministry-related activities. Universities are another exception. There are both government and private universities. Government universities may undertake projects—such as setting up a fiberoptic system for data communication with other universities. International associations also can be given exemptions. As of 1988 SWIFT was the only example in this category. Of course foreign embassies, notably the United States, may and have set up their own networks. Reuters Monitor Service has entered a contract with CAT to offer a service which, by law, can be offered only by CAT, TOT, or PTD.

The final exception is networks established through donation. A private party can install a system for its own use, donate it to CAT, TOT, or PTD, and then rent it back for a nominal fee. As an example, a television company signed a contract with the government to run a television station for thirty years by donating more than U.S.$10 million to establish a network, including satellite earth stations and microwave stations. All such plant became government property, the donor receives the concession to operate the stations by paying additional fees to the government. Bangkok Bank is another example, discussed below.

11.5.1 International Database Access (IDAR)

CAT began offering this service in April 1983. The number of subscribers has grown steadily from ten in 1983 to more than 100. IDAR's database and remote computing services are available from Telenet, Tymnet and a few university networks.

The equipment required to use IDAR include a sixteen-bit microcomputer and a modem. Sharp successfully bid to provide the microcomputers. CAT was renting them at U.S.$88–136 per month, depending on transmission speed, in 1987. At U.S.$88, the rental for two years easily equals the purchase price of a comparable microcomputer from Taiwan. Most customers, therefore, have purchased their own equipment and rent only the modem from CAT—subscribers may not use their own modem.

11.5.2 Society for Worldwide Interbank Financial Telecommunications (SWIFT)

SWIFT is a cooperative company created under Belgian law with an international headquarters in Brussels. It is wholly owned by its member banks, which in 1988 numbered more than 1,200 in fifty-seven countries. Members can be connected to the SWIFT network either by the use of a dedicated minicomputer

handling only SWIFT functions or by the use of a direct SWIFT link (e.g., the bank's central computer is attached directly to the network).

The bank's computer is linked to the country's regional processor, which is owned and operated by SWIFT, usually via a leased telephone line, at a transmission rate of 2,400 bps. The regional processor is normally linked to the operating center via satellite channels. For Australia and Asian countries, the operating center is located in Culpepper, Virginia.

11.5.3 Banks

TOT cannot provide enough telephone lines to its customers, especially residential users. Nonetheless the banking industry occupies a large portion of the network. Several banks have their own systems based on TOT and CAT networks as well as other international networks accessible through CAT. The banks have been ready and willing to establish their own networks and to release their leased lines for public uses. For example, some banks wish to install their own microwave networks. However, under present regulations they have been prohibited from doing so. Bangkok Bank's network will be discussed as an example because the bank is the largest commercial bank in ASEAN.

In 1982 Bangkok Bank Ltd. used a fleet of vans to transport cash between branches. Dispatching was done through CAT without encryption, allowing the schedules to be monitored by anyone who cared to listen. A private radiotelephone broadcasting system with encryption was recommended, with an equipment cost of about U.S.$3 million. The thirty-three-story bank building could be used as a transmission site. However, Thai law prohibited a private concern from owning broadcast equipment. After negotiation, the bank donated the system to PTD and rented it back for a nominal fee.

Bangkok Bank's international telecommunications network is based mainly on Intelsat. Bangkok is connected through the Pacific Intelsat to Singapore, Hong Kong, Taipei, Tokyo, and SWIFT in Culpepper, Virginia. Singapore is connected through the Indian Ocean Intelsat to Brussels, which is, in turn, connected to London as well as through the Atlantic Intelsat to Culpepper. The bank has over 330 branches, 216 of which are on-line through the mainframe network. The links are provided by TOT as leased telephone lines, microwave or a combination. Transmissions to and from the head office can be made at 4800 bps, and at 2400 bps otherwise. Average daily volume in 1987 was 180,000 transactions and the peak was 320,000. Most of this was posting demand deposits, with some loan management and other accounting.

In 1987 Bangkok Bank had 123 ATMs, ninety-three in Bangkok and its clearing area and thirty in sixteen other provinces. Monthly volume (mostly withdrawals) was U$60 million for the system, with the average ATM handling 400 transactions each day. In 1988 the bank installed twenty-two more ATM machines in twenty-two other provinces.

11.5.4 Interuniversity Network

In January 1986 an interuniversity computer network called ATUNET (AIT-Thailand Interuniversity Network) was established by the Asian Institute of

Technology (AIT). The AIT-RCC (Regional Computing Center) consists of two mainframes, an IBM 3083 and an IBM 3031. AIT is located about 42 km north of Bangkok. A microwave link has been installed to connect it with the nearest TOT telephone exchange.

Packet switching is not available in Thailand, so the nodes within the country must be connected to ATUNET either through microwave or telephone line links. Dial-up lines may be used, but the reliability of this is not good and leased lines are therefore recommended—however these are only available from the Bangkok area. Satellite links, such as those using Indonesia's Palapa, can also be used, but the user must install an earth station.

ATUNET has been linked with university networks in North America and Europe, including BITNET and EARN (European Academic and Research Network). Linkage has been established via the European Nuclear Research Center (CERN) in Geneva. ATUNET is also linked to ARPANET, CSNET, MAIL-NET, ACSNET, IBM'S VNET, and UCCPNET.

11.5.5 Reuters

Reuters service was introduced in Thailand in 1983, but it was handled from Singapore. The network carries four principal services. These are news, quotation retrieval (which transmits prices from exchange floors), the Reuters Monitor family of services for the financial, commodity, shipping and energy markets; and the Reuters Monitor Dealing Service.

Most Reuters customers in Thailand are banking and financial institutions, but CAT has not allowed them to take full advantage of the last two services. Specifically, Thai users are not permitted to contribute or enter information into the system. This restriction partially defeats the system's purpose. For example, a bank in Thailand wishing to convey information about the rate at which it is willing to trade currency must telex or phone its branch in Singapore or Hong Kong. That branch then enters the information into Reuters system. Some claim the reason CAT does not allow entering information in Thailand is that it wants to derive revenue from the resulting telex and long distance calls.

11.6 Procurement

In the early 1990s there were more than 100 companies in Thailand providing telecommunication and related equipment and services. The larger ones are branches of multinational corporations such as Ericsson, National, NEC, and Philips.

Because all three telecommunication organizations in Thailand are government organizations, their procurement policies must follow rules and regulations on procurement issued by the Office of the Prime Minister. Some of the important points of basic policy are summarized here. There are five types of procurement: small, cost-survey, bidding, special, and special-case.

As the name *small procurement* implies, the price must be relatively low (in the late 1980s, up to around U.S.$800). The procurement officer simply ob-

tains a quotation from a qualified supplier and gets approval from the head of the organization. The next level is *cost-survey procurement*, for items up to about U.S.$16,000. Two committees of three persons each must be established; one to ask for quotations from at least two suppliers, and the other to inspect the merchandise or service.

Bidding must be used when the cost is relatively high—more than U.S.$16,000. At least two, generally four, committees must be established. No overlap of members is allowed between committees, because the purpose is to ensure out-side review of previous steps. The steps are to accept the bidding documents, open them and check for qualifications, evaluate the bids, and to inspect and accept the merchandise or service. If only one bid is received or none of the bids meet the requirements, then the bidding must be canceled and a new bid called or special procurement requested. The lowest bid is usually selected, but exceptions are allowed. If the bids all exceed budget, negotiations can be undertaken, starting with the lowest bidder.

Special procurement includes auctions, emergency situations, secret service contracts, government-to-government transactions, purchases directly from manufacturers, and when all the previous other methods have failed. Authority for special procurement is vested with the board of directors of government enterprises; for government departments, approval may have to be obtained from the minister or the cabinet, as the case may be.

Special case procurement means there is a law or a cabinet decision stipulating what to do. Many of these simply require government agencies to use each other as sources. For example, certain local transportation services must be procured from the government's Express Transportation Organization. Telephone equipment for government agencies must be obtained from TOT. Other situations relate to financing, which may require procurement from companies of the loan provider's nationality. The Japanese tie a large percentage of their "aid" in this way.

The government sometimes requires a foreign source to involve a Thai counterpart so that someone local is available to take care of operation. If a government agency wants to hire a government university, college, or another government agency, then the contract can be entered directly without having to call for bids.

11.7 Build–Transfer–Operate Strategy

In the late 1980s Thailand had insufficient capital to expand the network, but recognized the need do so in order to sustain economic development, including attracting foreign investment. Thus, it was decided in late 1989 to allow TOT to join with major international companies to build new capacity. Bids were invited to provide and maintain 3 million lines—over twice the number in service at the time. The new systems were to be in place by 1996. They would be operated jointly with TOT for a period of years—up to thirty—with revenue sharing allowing TOT's partners to recover their costs, which were estimated at $5–6 billion.

To comply with Thai law, which was not being changed to facilitate the arrangement, TOT would technically own the system. Moreover, TOT's director of corporate planning stressed that this was a "temporary" strategy to satisfy backlogged demand, necessitated by a shortage of funds rather than a desire to joint venture or introduce competition.

Initial implementation moved quickly. Five groups had submitted proposals by May 1990, and the probable winners were named in the press in August. In September the speculation was partially confirmed. The Charoen Pokphand (CP) Group, the country's largest agroindustry group, was named the winner. CP's consortium included British Telecom. Contrary to expectation, CP got all 3 million lines. It had been thought it would get the 2 million Bangkok portion while a Japanese group would get the 1 million up-country segment.

The decision was immediately protested by members of the government, who felt it should have been debated by the cabinet. However, after some haggling, a contract signing was set for February 26, 1991. As part of the review process, a World Bank team suggested the basis of the proposal was inappropriate: build–own–operate was deemed more appropriate. TOT did not like this at all because it meant CP would be competing with TOT rather than simply expanding its capacity. In any case, the signing did not take place; there was a coup on February 23.

The new government undertook a review. CP had no previous experience in telecommunications, and British Telecom was merely CP's advisor rather than a partner in the bid—a fact that had given many observers pause from the beginning. It was also felt the revenue percentage retained by CP was excessive: 84 percent in Bangkok; 78 percent up-country. Nonetheless, TOT sought to proceed. However, the review committee could not decide on a negotiating stance and disbanded in May. The entire matter became a major political issue within the government. (For additional details see the *Bangkok Post Weekly Review*, which is in English, for May 31, 1991, p. 1; Jun 21, p. 20; and Jun 28, p. 1, as well as its Jun 30 midyear Economic Review issue, pp. 26–27; also, *Far Eastern Economic Review* Jun 13, 1991, p. 22 and p. 73, and Jul 4, p. 42.)

Things may yet change again; however, in January 1992 it was announced that Nynex, a Baby Bell, and TelecomAsia would be strategic partners in the Bangkok part of the project. Nynex would acquire an equity interest in Telecomasia, which is part of the CP group, and appoint many of the key personnel. Nynex is also interested in participating in the up-country network. CP gave up the right to bid on these lines as part of keeping those in Bangkok, thereby returning the overall project to its original conception in this regard.

11.8 Conclusion

Telecommunications in Thailand has come a long way from the first telegraph service in 1875 to satellite and computer services in the late twentieth century. However, it has a long way to go in the face of demands for more quantity and better quality. There is hope that the agreement between TOT and Charoen

Pokphand will help alleviate some of the problems. The arrangement is also a possible prototype for other countries (Indonesia is doing something similar) that do not wish to fully privatize their telephone networks, but lack the capital or other elements necessary to expand and upgrade them.

Bibliography

The following are in Thai. All are published in Bangkok.
Communications Authority of Thailand. 1983. *One Hundred Years of Telecommunications in Thailand*. Prayoonwong Press.
―――. 1983. *Postal Services in Thailand*. Prayoonwong Press.
―――. 1983. *Telecommunication Services*. Porsamphan Press.
Post and Telegraph Department. 1970. *Satellite Telecommunications*. Co-op Press.
―――. 1973. *90 Years of PTD, 1883–1973*. Army Press.
―――. 1980. *97 Years of PTD*. D & S Press.
Telephone Organization of Thailand. 1979. *25 Years of TOT*. Aksornsampan Press.