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The Development of the
Malaysian Telecommunica-
tions System

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Malaysia

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Rapid industrialization since 1970 has led to creation of a relatively advanced telecommunications system to address the complex needs of businesses for instantaneous information transmittal to and retrieval from points around the globe.

The development of telecommunications in Malaysia is traced and analyzed in this chapter, including its contributions to accelerated economic development. Some background is offered on Malaysia followed by discussion of telecommunications development during three time periods: preindependence, 1957–1970, and post 1970. Because privatization has become an important objective of the Malaysian government, this issue is analyzed at length, including the government's rationale and strategy for privatization.

8.1 Background

Malaysia has two major geographical parts: the Malay Peninsula and the northern part of the island of Borneo. Peninsular Malaysia, washed by the Strait of Malacca on the west and the South China Sea on the east, extends about 800 km from its northern border with Thailand to its southern end across the Johore Strait from Singapore. The states of Sabah and Sarawak make up Eastern Malaysia, some 650 km from the peninsula at their closest points and stretching another 1,100 km to the east. There are eleven mainland states plus the federal territory of Kuala Lumpur and Labuan. Total land area is approximately 330,000 km², 131,500 of which is on the peninsula.

Geography has made the peninsula a center of trade for millennia, and as such it has been repeatedly fought over and proselytized. Malacca's founding in the fifteenth century, succeeding Sumatra-based Srivijaya as regional hegemon, can be considered the beginning of an independent Malay history. The city served as both a cultural unifier of the Malay people as well as an outpost for the introduction of Islam, which its court blended with older Hindu–Buddhist influences. However, politically the region remained a number of small states—tributaries of Malacca, sometimes with intermarried rulers, but no real

central control. The states—sultanates—that emerged in the fourteenth and fifteenth centuries form the basis of the states in modern peninsula Malaysia. The Portuguese sacked Malacca in 1511 and held it until driven out by the Dutch (with Malay help) in 1641.

Malaysia's modern history began with colonization of the peninsula by Britain, a process marked by establishment of Penang in 1786 and Singapore in 1819. These, along with Malacca and a few other British-controlled areas, became the Straits Settlements in 1826. This was followed by the spread of British influence, which became rapid after the 1874 Treaty of Pangkor. By 1896 most of the peninsula, Sarawak, and Sabah were under direct or indirect British rule, and a 1909 treaty with Thailand brought the northern Malay states into the British sphere. It should be noted, however, that the British governed in large part through Residents who "advised" Malay rulers.

Organized economic development took place under colonial rule. Tin was being exported to India by the fifth century, but systematic and extensive exploitation of the lands around Kuala Lumpur, Ipoh, and Taiping for this and other minerals did not begin until the mid-nineteenth century. Rubber was introduced from Brazil in 1877 and was planted on a large scale in the early twentieth century. These activities led to a tremendous demand for labor. To meet it, extensive immigration from China was encouraged, beginning with the 1848 Larut, Perak, tin discoveries. The rubber booms brought Tamil and others from India.

The Federation of Malaya—the eleven peninsula states—achieved independence in 1957. In 1963 Malaysia was formed by the federation of Malaya, Singapore, Sabah, and Sarawak. Singapore left the Federation as an independent country in 1965.

Malaysia's mid-1990 population was estimated at 17.5 million (growing at 2.4 percent—15 million in peninsular Malaysia, 1 million in Sabah, and 1.5 million in Sarawak. Malays and other indigenous peoples constituted about 59 percent of the population (a share that is increasing because of higher birth rates), Chinese 32 percent, and Indians 9 percent. Gross Domestic Product (GDP) was U.S.\$43.1 billion (U.S.\$2460 per capita) in 1990.

8.2 Preindependence Telecommunications

During the mid-nineteenth century, postal, telegraph, and telephone services were organized in one department under the control of the state auditor. In 1884, to meet the needs of the mining industry in the states of Perak and Selangor, the Telecommunications Department was placed under the direction of the superintendent engineer. In 1902, the department's functions were extended to cover the whole of the Federation of Malaya and the responsibility for operations was transferred to a department head. (The Federation included the four states across the middle of the peninsula, which had agreed to a federal government in 1896 with a capital at Kuala Lumpur.)

After World War II, as a step toward independence, Britain for the first time

politically unified the entire peninsula (except Singapore) as the Malayan Union. As part of this, on April 1, 1946, the department was renamed the Malayan Telecommunications Department and given the specific mission of regulating and providing telecom services nationwide. Sabah and Sarawak became crown colonies, and their telecom services were separate. Legislation spelling out the department's powers was formally enacted as the Telecommunications Act of 1950.

8.2.1 Telephone Services

The first telephone was brought to Malaya in 1874 by the newly appointed British resident assigned to Perak. Telephone services were needed to enable him to better monitor the political and social unrest that was then prevalent due to fights among various mining clans in the region. The first exchange was completed in Kuala Lumpur in 1891. By 1907, six more had been built in Perak to cater to the expanding needs of the tin miners. As the number of subscribers increased, the need for an automatic exchange became apparent. In 1930, the first was completed, together with a new carrier system linking Kuala Lumpur, the federal capital, and Ipoh, capital of Perak. This was later extended to Singapore and other states. Demand for intercity services grew so rapidly that twenty automatic exchanges were completed in Selangor (the area around Kuala Lumpur) alone by 1933. However, during World War II hundreds of telephone and telegraph poles were uprooted, along with hundreds of miles of copper wire, which severely impaired the system.

In Sabah and Sarawak, the development of telephone services began in 1900 when the service was launched in three towns. Since then, service has expanded to meet the needs of loggers.

In 1947 there were an estimated 14,000 telephone subscribers nationwide. By 1957 the number had reached 61,000, with a backlog of 2,000.

In addition to expanding domestic service, there was dramatic growth in international calling. The first overseas telephone service began in 1936 with a single circuit linking Kuala Lumpur to Indonesia. The boundary station would then relay calls to Amsterdam and on to London. This arrangement was terminated for security reasons in 1939. After the war, international calls were routed via Singapore to London. To meet demand, more direct links with other countries, particularly to Asia and the Commonwealth, were established. In 1957, 24,100 international radiotelephone calls were made from Malaya and Singapore. Notwithstanding fairly extensive linkage, the relatively large number of interconnections required before a call could reach its destination amplified noise levels and reduced the quality of transmission.

8.2.2 Telegraph, Telex, and Other Services

Telegraph service was introduced to Malaysia in 1876 with the installation of a telegraph line between the British resident's office in Kuala Lumpur, the British assistant resident's office in Taiping, and the attorney's office in Ma-

tang, Perak. Private subscribers were allowed to utilize the link, and there was soon sufficient demand to make it a profitable government operation. This led to installation of a line from Kuala Lumpur to Malacca in 1886, which was later extended to Singapore and overseas.

Telegraphic equipment with high-speed typewriters was used to receive messages by the late 1920s. Next came a wireless connection between Kuala Lumpur and Kuantan on the east coast. By 1957, 1,125,053 messages were handled annually in the Federation and 654,648 in Singapore. Service was further improved by introduction of the multiple-type teleprinter exchange.

Two wireless stations were in operation in 1926—in Penang and Singapore—where they provided radio communication services with ships through the 500 kHz international marine frequency. Following unusually large floods in 1926, a radio warning system was set up to provide alerts along the Pahang River, the country's longest. This station eventually became the center for extension of the radio network. Stations were staffed by the Malayan Radio Amateur Society until it closed in the early 1930s. The Telecommunications and Post Department took over responsibility until 1942, when Radio Malaya, which the Japanese occupation forces had assigned the mission of maintaining radio stations for the police, took over.

The end of the war saw an eruption of communist insurgency, and the system of radio stations became a vital instrument in the government's fight for the hearts and minds of the people. By the end of 1957 the number of stations in the Federation was 667 fixed VHF stations, 287 mobile VHF, 62 fixed HF, and 168 mobile HF. The extensive system enhanced communication capabilities between security forces and the police, enabling them to better monitor the political and social situation. This contributed to the government's ability to isolate the guerrillas and, ultimately, terminate the communist insurgency.

In 1957 there was a Pan-Malayan teleprinter exchange network with 125 exchanges and 32 telex trunk circuits. Telex service became increasingly popular as its costs dropped to become one-third cost of an equivalent day rate telephone trunk call. The needs of service industries for written confirmation of messages further contributed to its popularity.

8.3 Telecommunications, 1957–1970

With independence, the organization of telecom services was reviewed. In addition, constitutional changes made both in the Federation and Singapore affected organization of Pan-Malayan telecommunications. Immediately after independence the government accordingly decided to:

1. Seek membership on the Commonwealth Telecommunications Board.
2. Become a Partner Government submitting to the Commonwealth Telegraphs Agreement of 1948.
3. Acquire the assets and take over operation of the Cable & Wireless installations in Penang.

4. Set up a Pan-Malayan Telecommunications Advisory Committee, in conjunction with the State of Singapore.

On September 1, 1962, the cable station in Penang was taken over. The local staff, absorbed into the Telecommunications Department, continued to staff the station. Also in 1962, Malaya became a participating member of the Commonwealth Telecommunication Board.

Because telecom services had originated and been developed under British rule, all the senior technical and managerial staff of the department were British expatriates; Malaysians were confined to roles as technicians, assistants, and clerks. At independence, Malaysianization of the department became a priority because telecom services were considered a foundation of national security and defense. To assist Malaysianization, three supplementary superscale posts were created in 1959 to expose Malayan officers to higher responsibilities and to enable them to gain valuable managerial experience. In 1961, the organization was expanded by separating responsibility for planning and operations at the director level.

With the formation of Malaysia in 1963, all telecommunications matters, including the Singapore Telephone Board, became a federal responsibility under the portfolio of the minister of works, posts, and telecommunications. V. T. Sambantan, the first minister, was a relatively senior minister and saw to it that the department was accorded the necessary budgetary allocations. In the case of Singapore, the director-general of telecommunications was accorded complete responsibility for the department, as opposed to the somewhat limited responsibility he exercised while Singapore was still a Crown Colony. The Posts and Telegraphs Departments in Sabah and Sarawak were merged into one regional entity under the direction of a regional director of telecommunications who was in turn responsible to the secretary-general of the Ministry of Works, Post, and Telecommunications.

Paralleling these organizational changes, human resource development and training were given particular emphasis. Many Malaysian technicians were encouraged to take the London City and Guilds Examinations locally to enable them to qualify as technical assistants. Classes were conducted by the department with British engineers often serving as course instructors. A number of technical assistants were sent to the United Kingdom to acquire professional qualifications as engineers, particularly diplomas in electrical engineering awarded by British universities and polytechnics. They were placed in assistant controller positions on their return and rapidly promoted to controller and director positions.

Over the 1958–1965 period, the government also sent about fifty of its best high school graduates to acquire degrees in telecommunications engineering under the Colombo Plan Aid Programme in countries such as Australia and New Zealand. The British government also offered scholarships to those chosen by the department for professional engineering courses in the United Kingdom.

As a consequence of this technical training assistance, Malaysianization proceeded rapidly. By 1965, the program was completed, and, for the first time,

a Malaysian, Chew Kam Pok, a former technical assistant who had obtained his tertiary engineering qualifications in the United Kingdom following independence, was appointed director-general of telecommunications.

In January 1965, the department took over Singapore's External Services. After Singapore separated from Malaysia in September 1965, however, management was handed over to the Singapore government.

In 1966, a telecommunications training center was established in Kuala Lumpur with the support of the International Telecommunications Union (ITU) and the United Nations development program. The center provides in-service training to its technical staff to help upgrade their knowledge of telecommunications. Special emphasis has been placed on upgrading maintenance and installation capabilities. The center in its initial stages relied heavily on the Australian Post Office, which provided most of the instruction under a bilateral technical assistance program and offered training facilities in Australia. During 1966–1970, about forty Australian instructors held visiting appointments and another twenty Malaysian engineers received training in Australia. By 1970 the bilateral program was completed; the center has been manned since completely by Malaysians. The department is now able to train technical staff—including new hires and skill upgrading.

The organizational changes needed to cater to rapidly expanding demands following Malaysianization and consolidation were completed by the late 1960s. At the top is the director-general of telecommunications. Assisted by a deputy director-general and several directors, he implements telecommunications policy, which is formulated with his advice by the Minister of Works, Post, and Telecommunications. This group constitutes the directorate, generally known within the department as the "wise men." Executing directorate decisions are a group of controllers. Each is assigned a specific area of responsibility (i.e., exchange). Assistant controllers or above must be qualified engineers. (After privatization of Telekom Malaysia, many of these functions were transferred to the new company).

Technical assistants, who are graduates of polytechnics institutes, and technicians constitute the core of the maintenance and installation staff. Each installation or maintenance team, consisting of linemen and cable layers or installers, is headed by a technician under the supervision of a technical assistant.

Given the relatively advanced state of the infrastructure built by the British, an important objective of the new government was to maintain and enhance it so that the country would continue to have one of the best telecommunications systems in Asia. To achieve this objective, relatively generous budget allocations were made, allowing purchase of the latest equipment. As Table 8.1 shows, during 1966–1970 some 1.9 percent of the total national plan budget was spent on telecommunications.

In particular, the government adopted a very liberal attitude toward equipment imports. In all tender exercises the major criteria for awards were price and quality. Under this policy, foreign non-British suppliers began to make their presence felt. Ericsson became a major supplier of exchange equipment, while Fujitsu and NEC emerged as major suppliers for transmission equipment,

Table 8.1. Public Development Expenditure Allocated for Communications under Each Five-Year Plan, 1966–1995

1966–1970	1971–1975	1976–1980	1981–1985	1986–1990	1991–1995	Allocation
196	717	1,200	2,900	848	201	in MS million
1.9	5.0	2.7	2.5	2.3	0.37	Percentage of Plan Total

Source: *Malaysia Plan*, various issues.

Includes broadcasting and information.

cables, and lines. U.S. manufacturers were distinctly absent, mainly because of the then relatively high value of the U.S. dollar.

8.3.1 Growth of Domestic Telephone Services

In 1959, increasing demand for telephone services in major towns brought introduction of a microwave system between Kuala Lumpur and Singapore. The system had 600 telephone channels. In 1963, it was extended from Kuala Lumpur to Penang, and later expanded to cover the east coast states. In 1962, subscriber trunk dialing—initially limited to Kuala Lumpur, Klang, and Port Swettenham—was expanded through a major trunk route connecting Kuala Lumpur to Singapore, Seremban, and Malacca. By the end of the 1960s, cables and microwave links continued to broaden coverage and enabled direct subscriber dialing among the major population centers in the peninsula, as well as operator-assisted trunk calls among all towns and villages.

The increasing number of subscribers and shortages of equipment, including telephone sets, were compounded by implementation delays for cable and exchange schemes. The waiting list for service rose from 2,075 in 1957 to 13,704 in 1970. To overcome this growing unmet demand, the department contracted Ericsson to establish a crossbar telephone exchange equipment assembly factory in Malaysia.

The department also negotiated with Mitsui to establish a cable manufacturing plant. Mitsui, however, felt local demand was too small to justify a plant. Further, Japanese imports of cables were facilitated by a generous yen credit from the Japanese government. Under the credit, all purchases of telecom equipment would be financed by a Japanese loan with an initial grace period of five years and repayment over fifteen years at 4 percent.

While domestic service developed satisfactorily in the peninsula, service in Sabah and Sarawak did not improve significantly in the early 1960s. Sabah and Sarawak continued to remain highly dependent on timber extraction with its comparatively minimal need for telecom services. The advent of political uncertainties caused by the Indonesian Confrontation during 1964–1967 (Indonesia's opposition to formation of Malaysia) accelerated development of telecommunications for security and strategic reasons. In 1965, the first stage of the South East Asia Commonwealth (SEACOM) Cable linking Kuantan in the

peninsula and Kota Kinabalu in Sabah was completed. Internal services within Sabah were also given a boost as a result of this link.

Although the SEACOM cable improved linkage between the peninsula and Sabah, the connection to Sarawak was constrained by dependence on transmission via the Kota Kinabalu–Kuching radio link. In 1970, the Gunung Pulai–Gunung Serapi Troposcatter Link between the peninsula and Sarawak became operational, providing forty-eight telephone channels. With the opening of this link, subscribers in Sarawak gained access to national and international facilities in peninsular Malaysia. By 1970, the peninsula, Sabah and Sarawak were relatively well connected, which has contributed in no small measure toward the forging of a united Malaysian nation.

The number of subscribers grew to 176,000 by 1970 compared to 61,000 at independence. Annual growth in subscribers over the period 1957–1970 was only 8.5 percent. This can be attributed to the long delays experienced in the supply of cables and telephone equipment, the extensive reorganization of the department in the period immediately after independence, and the replacement of British expatriates by relatively inexperienced Malaysians as controllers and directors—which led to temporary declines in implementation capabilities of the department. The experience acquired by the new local staff, however, placed the department in a good position to expand in the post-1970 era.

8.3.2 International Telephone Service

A significant milestone for Malaysia in overseas communications was achieved in 1965 when high-quality cable telephone circuits were established to replace high frequency radio service. This was made possible by completion of the first stage of SEACOM. Telephone circuits were also established between Kuala Lumpur and Hong Kong and between Kota Kinabalu and Hong Kong. In 1966, SEACOM was extended to Guam to link with the Japanese-American Trans-Pacific Cable, making it easier to call Japan, the United States and the United Kingdom. Through SEACOM Malaysian overseas telephone service covered countries by 1970. International calling has increased from 23,000 calls in 1965, to 69,000 in 1969, to over 69 million in 1991.

8.3.3 Telegraph, Telex, and Other Services

Although international telex service was inaugurated in 1959, it was not until completion of the Kuala Lumpur–Kota Kinabalu and Kota Kinabalu–Hong Kong SEACOM cable in 1965 that they were widely used. Operations on radio telegraph and telex circuits were transferred to cable with radio circuits in Singapore serving as a standby. In 1968 the department began a program to renew teleprinters, many of which were obsolete. Many printers had been replaced by 1970, greatly improving system efficiency. A nationwide teleprinter broadcast network was installed for the Malaysian National News Agency. In 1970 the number of telex messages was 75,718 while telegrams numbered 1,172,182.

Pilot television service began in 1963, initially covering only the Kuala Lum-

pur area. However, this was quickly extended to practically all the west coast by 1964, and later to the east coast. By 1970 a satellite communications ground station was completed in Kuantan, making live telecasts from overseas possible. In addition, the department rented a transponder over the Pacific to provide transmission of television programs to Sabah and Sarawak from peninsular Malaysia, enabling live coverage of important events. Additional microwave radio links were also installed on the east coast, enabling improved tv transmission. By 1970, an estimated 70 percent of the population had good reception.

8.4 Telecommunications Since 1970

The 1969 racial disturbances in Malaysia led to the 1970 implementation of the new economic policy (NEP) with its two-prong objectives of eradication of poverty and restructuring of society to eliminate identification of economic functions by race; in particular, the policy sought to raise the economic status of Malays and other natives of the region, collectively known as bumiputras, to that of nonbumiputras, in particular, the Chinese. This ambitious plan was to be implemented in the context of a growing economy so no particular group would feel any sense of loss or deprivation. In an attempt to insure growth was actually forthcoming, the government undertook a strategy of accelerating industrialization by encouraging the inflow of foreign investments, as well as deliberate public sector interventions.

The ambitious economic growth and restructuring program required upgrading infrastructure, in particular facilities for telecommunications, as the hoped-for massive inflow of foreign investment implied demand would grow rapidly. However, the organizational structure completed in the late 1960s had not envisioned a dramatic shift toward export-oriented industrialization and services. Although the department attempted to expand its implementation capacity, it was still plagued by staff shortages, in particular of qualified technical personnel. To overcome this, many new recruits, particularly Malays, were hired and given crash courses at the Training Center.

Despite the increase in staffing, however, shortfalls in installation targets were still being encountered, and complaints from the private sector and the general public regarding the "inefficiency" of the department became commonplace. Numerous letters were published in the newspapers about the slow response to requests for lines, as well as delays in repairs and failure to deal with overcharging.

These problems were exacerbated by continued shortages of equipment and cables, and the complex process of land acquisition for telephone exchanges. Land is under the jurisdiction of the state governments. The department, being a federal department, must obtain approvals from state authorities for the sites where exchanges are to be built. Approvals take up to two years because the state authorities are generally reluctant to allocate land, as they do not derive any revenues for doing so.

Better coordination with the states was essential to overcoming such problems. In 1978, the department was placed under a revamped Ministry of Energy, Telecommunications, and Post and the responsibilities for "Works," including roads and other infrastructure, was taken over by a new ministry. An extensive reorganization of the telecommunications department was carried out with a view toward greater decentralization. The new organization was organized through the national headquarters, regional headquarters, and area offices.

The thirteen states were grouped into seven regions. More power regarding planning, implementation, and maintenance and operational management was given regional directors. The idea was to enable them to deal more smoothly and effectively with state authorities and to enhance the department's implementation process.

With greater regional autonomy, many new positions were created, especially at the regional levels. However, due to the shortage of qualified applicants, a large number of these could not be filled. At the end of 1981, of 35,423 approved posts only 26,965 had filled, a 24 percent vacancy rate compared to only 10 percent in 1980. Most vacancies were in technical areas, which severely constrained the expansion capability.

The inability of the department to meet the rising expectations and needs of a more industrialized economic structure, despite huge government allocations for provision of telecommunications, induced a complete reappraisal of the government's strategy.

It was generally felt the telecom sector was over regulated, so the department was not able to respond quickly. The 1950 Act empowered the department to be the sole entity in the sector, doing everything from purchasing and installing microwave transmission systems, telephone exchanges, underground cables, overhead cables, internal household wiring, and other equipment, to providing domestic and international telecom services. As a result of this strong monopolistic position, significant distortion occurred in pricing. While domestic calling rates were kept low, due to political pressures applied by the government, international calling rates were very high by international norms. For example, a three-minute station call to London cost M\$34 in the early 1970s, about double the inbound rate. International telex calls were also high. Given the proximity of Singapore, where charges more closely reflected market prices, many businesses resorted to using Singapore as a rerouting center for international telex messages, causing a substantial loss of revenue.

In 1972, an amendment to the 1950 Telecommunications Act made the department operate on "commercial principals." All monetary transactions including revenue from services are now processed through the Telecommunications Fund, out of which the department's operating costs are paid. Any operating surplus is channeled to financing development projects. The amendment's objectives were to make the department self sufficient in terms of revenue for development, as well as to enable it to earn a targeted 6 percent return on its assets.

Instead of becoming self sufficient, the department had annual deficits of

over M\$1,000 billion by 1984. During 1976–1984 revenues increased fourfold, but operating expenditures went up five times and development expenditures increased eightfold. The result was a cumulative nine-year deficit of M\$3.7 billion, covered by the government. The deficit would have been M\$394 less had operating costs remained the same percentage of revenues as in 1976. Total development outlays over the period were almost M\$6 billion.

The onset of global recession in the early 1980s, with its severe impact on government resources, led to drastic cutbacks in public sector spending. Cutbacks, however, had to be made in a way that did not affect the ability of the department to provide more and better service—which was considered crucial to the development of the country. Subcontracting was deemed appropriate.

In 1980, responsibility for internal household wiring was allocated to a large number of designated cable subcontractors. A major shift in policy toward suppliers of customer equipment was also announced. While the department had been the sole source and installer of CPE (including private telephone connecting equipment—PBX—telex systems, and cordless telephones), from 1980 several international manufacturers—including Ericsson and Fujitsu—have been authorized to supply and install end user equipment for the public. Their systems have to be approved by the department. Generally, however, the department approves anything compatible with its existing system, and has not been restrictive of the variety of offerings.

To improve procurement efficiency, the department decided in 1982 to select a number of manufacturers as long-term suppliers of switching equipment. It awarded a contract for the supply of digital switching equipment over the period 1982–1992—valued at M\$1.23 billion—to two local–foreign joint venture companies, Pernas–NEC and Perwira Ericsson.

A major constraint on increasing capacity was the delay in getting cable routes completed. A decision was thus made in 1982 to subcontract cable installation, which is discussed later. In 1984 the government announced its intention to privatize the whole department, and this took place in 1987. The process is taken up later.

8.4.1 Service Growth

The major objective of the department was to reduce its long waiting list. During 1971–1975 numerous underground duct and cable routes were installed in major towns. This, however, did not solve the problem because there were still considerable delays in completion of the central office exchanges. In 1974 it was decided that temporary cabin exchanges would be imported from Japan as an expediency measure in certain areas, particularly in Kuala Lumpur, Johore, Ipoh, and Penang.

Crossbar main exchanges, introduced by Ericsson in the late 1960s, were found to be unreliable and limited in functions. In 1975 a strategic decision was made to phase them out in favor of newly developed electronic exchanges. The first was in 1976. This change facilitated introduction of international subscriber dialing (ISD) in 1979. Initially the service was available only to some

exchanges in Penang, Klang, Kuala Lumpur, and Petaling Jaya. However, by 1989 ISD was available to over 80% of subscribers, enabling direct dialing to over 150 countries.

Progress in ISD was followed by similar progress in the expansion of subscriber trunk dialing (STD) within Malaysia. The 1981 completion of the Kuantan–Kuching cable allowed STD between the peninsula and Sabah and Sarawak. By 1985, the whole of peninsular Malaysia had STD. Similar progress was made in Sabah and Sarawak; it reached over 80 percent coverage by 1987. Introduction of STD not only improved service quality, it also drastically reduced the costs of making trunk calls, particularly between peninsular Malaysia and Sabah and Sarawak.

Malaysian Packet Switched Public Data Network (MAYPAC) and Malaysian Circuit Switched Public Data Network (MAYCIS) were introduced in 1984. These are separate switching networks designed for data communications using packet switching and circuit switching technologies, respectively. The following year, automatic telephone using radio (ATUR) was introduced, making Malaysia the first country in Asia to successfully launch the system nationwide. ATUR makes use of radio cellular technology and is particularly useful for residents in remote areas where installation of telephone lines is very expensive. Users are connected to the network via radio transmission through special stations and exchanges.

There has been a substantial expansion of the number of telephone subscribers, as shown in Table 8.2. Although businesses had been the main users,

Table 8.2. Telephone Subscribers and Backlog, 1970–1990

Year	Subscribers		Backlog	
	Number (in thousands)	Percentage Increase	Number (in thousands)	As Percentage of Subscribers
1970	176	—	14	7.8
1976	194	14.6	65	33.6
1977	228	17.1	76	33.6
1978	271	19.1	84	31.1
1979	325	20.0	106	32.5
1980	396	21.7	134	33.8
1981	489	23.5	150	30.7
1982	585	19.8	190	32.4
1983	700	19.6	200	28.5
1984	849	21.3	191	22.4
1985	959	13.0	332	34.6
1986	1,043	8.8	348	33.3
1987	1,132	8.5	297	26.2
1988	1,248	10.2	319	25.6
1989	1,336	11.2	347	25.0
1990	1,586	14.3	385	24.3

Source: Department of Telecommunications Annual Report, various years.

residential lines exceeded business lines by the late 1970s. By 1986 the ratio of residential to business lines exceeded 2:1. The telephone per capita ratio increased steadily, and by the early 1980s Malaysia was in the high telephone users group among developing countries.

Despite this expansion, a large demand for telephone lines remained. The backlog actually increased over 250 percent, going from 8 percent of existing subscribers in 1970 to a peak of 35 percent of a much increased base by 1985. Areas of unmet demand included new housing estates where cable routes and central offices were not completed on time, downtown areas where exchange line capacity had been fully exhausted, and rural areas where service remained economically unfeasible. In other words, almost everywhere.

The Telecommunications Department's objective was to have a network of 1.5 million telephones by 1985 and 2.4 million by 1988, with the ability to implement service within one week of application. The ultimate aim was to provide universal access by the year 2000. However, only about 1 million telephones were installed by 1985. Absence of private sector initiatives is considered a major factor in this. The department, known as STM after 1987, has a complete monopoly over the provision of telephone services. Rural subscribers, because of their sparsity, are financially unattractive customers. Rural per line installation costs are on average about two or three times those for an urban subscriber, and all users are charged essentially similar installation rates.

Data on revenues and expenditures of the department by urban and rural areas are not available. Discussions with the department indicated over 80 percent of its revenue is generated by urban subscribers; however, only about 60 percent of expenditures are incurred in urban areas. While rural subscribers contributed over 10 percent of revenue, they accounted for about 40 percent of total expenditures. Given the sociopolitical necessity of providing services to rural (primarily ethnic Malay) subscribers at "acceptable" rates, this urban-to-rural subsidy is perhaps unavoidable.

In 1991, in connection with the sixth (1991–1995) development plan, STM began a five-year M\$5.5 billion (U.S.\$2 billion) investment program. The intention is to almost double the number of subscribers, to 3.1 million, and have 25 percent density by 1995, with an emphasis on additions in rural areas. A domestic fiberoptic network and other equipment upgrades are also in the plan. Overall, the government expected M\$11 billion to be spent on telecommunications during the plan period, compared to M\$3.9 billion during 1986–1990.

8.4.2 Other Services and Competition with STM

Facsimile (called telefax) made its Malaysian debut in 1983. A 6,000 line SPC telex exchange was commissioned in Kuala Lumpur in 1982. It was installed as a local, national, and international switching center, with the last supplementing the existing system. In 1986, an international computerized telex exchange with 3,000 lines was completed. These developments led to a doubling of users from about 5,800 in 1982 to 11,200 in 1986.

Hutchinson Telecom of Hong Kong launched paging service in 1991, and

thirty-two others have licenses. STM is not allowed to offer paging. Licenses have also been issued to twelve private mobile radio systems, and thirteen firms will be allowed to operate CT2 systems. Celcom began competing with ATUR (owned by STM) in 1989, gaining over 8,000 subscribers by mid-1990, compared to over 40,000 for ATUR. Celcom operates in the Kuala Lumpur and Johor Baru areas, while STM's system is nationwide. In pay telephones, Uniphone has been allowed to compete in urban areas. In February 1992 Skytel (M), a joint venture of Mobile Telecommunications Technologies, was licensed to develop a nationwide and international messaging system. Using Mtel's technology, alphanumeric messaging, voice mail, and transmission of international messages will be available.

8.4.3 Regional Collaboration

Regional collaboration in the supply of telecom services, particularly cooperation between Singapore and Malaysia, was born out of historical necessity. Singapore and Malaya have developed as a sociopolitical unit. During the colonial and pre-1965 independence periods priority was given to Singapore as a communications center for the peninsula. Although Singapore left the Federation in 1965, the basis for collaboration remained intact. Singapore is part of the domestic dialing network for Malaysia. Until the late 1970s, Singapore remained an important international dialing center for Malaysia.

Kuala Lumpur–Singapore is the most profitable route in the Malaysian network. The department consults its Singapore counterpart regularly on matters relating to changes as well as on the variety and type of services that can be offered over it.

The department also collaborates closely with Thailand on provision of telecom service between the two countries. In view of the close interaction between Penang and south Thailand, a special concessionary rate applies to calls between peninsular Malaysia and south Thailand. Special emphasis is given to insuring there is no congestion or delay in calls between peninsular Malaysia and Bangkok. Most of these calls move on a microwave trunk line up the Kra Isthmus.

Since early 1970 the department also interacted frequently with other telecom authorities in the Asia Pacific region, particularly those in Japan. Japanese manufacturers are major sources of technology, expertise, and financing assistance. This is clearly manifested by the many Japanese firms—ranging from cable and switching equipment manufacturers to makers of end user equipment—that have established subsidiaries or joint ventures in Malaysia. With the privatization of telecom services, their role in modernizing the system could become even more significant.

8.5 The Malaysian Electronics Industry

To provide perspective on the impact of international trends toward privatization on telecommunications in Malaysia, a discussion of the electronics indus-

try, indicating the existence of a pool of domestic expertise in electronics and telecommunications, is appropriate.

Domestic electronics production began in Malaysia in 1966. Two years later, impetus for growth was given when the government designated it one of the priority, and premier, industries for investment incentives.

Part of the motivation for this was the realization that early starters such as Korea, Taiwan, and Hong Kong were likely to have their comparative advantage eroded by labor shortages, increasing wages, and higher costs. This optimism was also founded on the findings of a 1969 survey of the electronics industry in South East Asia by the Japan Electronics Industry Development Association. This found Malaysia possessed an abundant labor supply of generally good quality, subdued trade union activity, and low wages. A summary of findings on labor conditions is given in Table 8.3.

In 1970, when aggressive promotion of the electronics industry began, there were five joint-venture companies in operation. Four—Matsushita Electronics, Sanyo Industries, and Roxy Electronics Industries plus Toshiba—were with Japanese, one—Malaysian Lamps—was Philips. At that time, three more joint ventures had been granted approval. These companies were engaged in the production or assembly of television sets, receivers, radios, and other household electrical goods, as well as lamps. Employment in the industry since 1968 is summarized in Table 8.4.

Malaysia has emerged as a major exporter of integrated circuits and electrical appliances, beginning in the 1970s. In 1985, electronics contributed 15 percent of value added in manufacturing, up from 7 percent in 1978. An important feature of the electronics sector is its narrow scope. About 90% of the sectoral

Table 8.3. Labor Conditions in Selected Asian Countries, 1969

Condition	Japan	Hong Kong	Taiwan	Korea	Singapore	Malaysia	Thailand
Labor Availability	Shortage	Still available	Abundant, but	Abundant	Abundant	Abundant	Abundant
Quality of Workers	Good	Good	Good	Good	Good	Chinese are Good	Depends on training
Overall Average Monthly Wage (in 000 yen)	18-23	10-15	7-9	6.5-8	9-12	11-12	5-8
Electronics Industry Monthly Wage (in U.S.\$)							
Minimum	50	28	19	18	25	17-30	14
Average	57	35	22	20	29	19-31	18
Maximum	64	42	25	22	33	22-33	22
Bonus ^a	3	1-2	1	1-2	1	1-2	1-2
Unions							

Source: Cheong et al. 1981.

For Malaysia, the higher electronic wages are for Kuala Lumpur area, the lower are for other parts of the country.

^a Annual bonus in month's wages.

Table 8.4. Electronics Industry Employment (in thousands), Peninsular Malaysia, 1968–1990

1968	1973	1978	1983	1986	1990	
0.2	21.1	53.6	75.7	70.9	148.2	Total in Electronics
120.8	268.2	368.3	448.0	289.3	465.0	Manufacturing Total
0.1	7.9	14.6	16.9	24.5	31.9	Electronics as Percentage of Manufacturing

Source: Malaysia, Department of Statistics. *Industrial Surveys*, various years.

Includes radio and television sets, sound reproducing and recording equipment, semiconductors, other electronic components, and communication equipment and apparatus.

value added, and 86 percent of fixed assets, were in the components subsector in 1985. Other subsectors, such as manufacture of radio and television sets have been relatively unimportant. Electronics and electrical machinery and appliances rose from 48 percent of total exports of manufactured goods in 1980 to 57 percent in 1991.

In 1989 the country imported M\$2.11 billion (U.S.\$784) of telecom equipment and exported M\$2.09, chiefly from foreign joint ventures. There were forty to fifty Malaysian-owned network and terminal equipment suppliers, with a combined annual output of M\$50–100 million (*Far Eastern Economic Review*, Mar. 7, 1991, p. 43).

The government has given specific incentives to existing assemblers to upgrade their activities. In the late 1980s National Semiconductor established a wafer fabrication plant in Penang, and Intel seriously considered building another such plant. The Japanese have been less willing traditionally to transfer technology or otherwise do much more than provide “women’s work” at their assembly plants, but this is slowly changing. Still, over the coming decade, electronics and computer-related components should be the country’s major growth industry.

8.6 Turnkey Projects

The relative inefficiency of the Telecommunications Department as a government organization is demonstrated by its inability to clear backlogged requests for service. The heavy capital requirements building networks involves is another drain on the constrained revenue generating capacity of the government. As a result, since the early 1980s the government has been compelled to seriously examine privatization. (Although not explicit, it is assumed privatizing telecommunications would lead to an expansion of bumiputras participation in the corporate sector.)

In many respects the private sector has been involved in development of telecommunications in Malaysia for over two decades. Private corporations have subcontracted installation work and manufacturing operations since the early

1970s. In 1973 the National Trading Corporation, known as Pernas, formed a joint venture with NEC—Pernas NEC—to manufacture and install computerized digital switching equipment. Since then, Pernas NEC has extended operations to semiconductor components and multiplexing equipment. Also in 1973 Ericsson formed a joint venture known as Perwira Ericsson with the Armed Forces Fund Board to manufacture switching equipment. Since then Perwira Ericsson has diversified into manufacture of PABXs and mobile telephones.

In the early 1980s Marconi, a GEC-controlled company was awarded a contract to locally assemble pulse code modulation (PCM) transmission equipment. In 1986, Komtel, a subsidiary of Sapura Holdings, a major local telephone manufacturing concern, was awarded the contract to develop a paging system for the private sector using a numeric/alpha display system rather than a voice message system.

Seeking to overcome delays in getting the cable routes completed, it was decided in 1982 that the department's planning and installation of cable should be subcontracted. This was also intended to reduce the financial burden on the department and enable it to reassign its cable laying work force to other functions. Because the subcontractors are not required to follow government procedures, they can purchase required materials more rapidly. It was thought that this would accelerate construction.

The major contracts for the planning and implementation of outside plant network projects during 1983–1988 were awarded to four bumiputra contractors. All four were established by former employees of the department who had either retired or resigned to establish corporations specifically geared toward securing contracts. Each has a foreign partner.

The work was valued at M\$2.5 billion (about U.S.\$1.1 billion at the time) and sought to provide an additional 1.76 million telephone lines by 1988, which would have increased total telephone lines to 2.4 million. The plan was ambitious, and Datuk Leo Moggie, minister of energy, telecommunications, and posts, declared that, "By 1985 we hope to have 1.5 million subscribers. We have to install many more lines. We will move fast. We are convinced that there is no other way to achieve these targets but to get the private sector involved on a turnkey basis" (*New Straits Times*, Oct 15, 1983).

The contract was distributed to a spatial basis as follows (foreign partner in parentheses):

Binaphone (Philips): Kelantan, Terengganu, Negeri Sembilan
 Electrocon (Ericsson): Pahang, Malacca, Johore, Kuala Lumpur (part)
 Sri Communications (various): Penang, Kedah, Perlis, and Sabah
 Uniphone (Sumitomo): Selangor, Sarawak, Kuala Lumpur (part)

Specifically, the aims of the contracts were to:

1. Provide cable pairs to enable the department to clear all backlogged requests by 1985.
2. Install a main cable network capable of meeting demand for the next five years.

3. Install a distribution cable network capable of meeting demand for the next twenty years.
4. Install a duct and manhole system capable of meeting demand for the next thirty years.

Effective coordination by the department was crucial to monitor the contractors and to insure that subscribers were connected with telephones provided by the department once cable work was completed. To achieve this, a project management group was to meet with the contractor in each region on a monthly basis. Overall monitoring was by a steering committee chaired by the minister.

8.6.1 Evaluation of Turnkey Projects

There has been much criticism of the turnkey projects. The contractors were selected without a public tender, leading to speculation inflated costs were shouldered by the government. More important, in 1991 over 310,000 of the lines (18 percent) had still not been completed and not one of the contractors had even come close to meeting the targets.

Each side blames the other. It is generally agreed that the major factor has been delays in approving plans submitted by the contractors, but there is contention as to who is responsible for this. All plans have to be approved by the department, and implementation bottleneck of the preturnkey era have not been overcome. The public works department and local authorities also have to sign off on plans. There have also been shortages of materials and manpower. In addition, contractor staff was relatively inexperienced, but this was somewhat overcome by 1985 when more foreign staff were recruited for design and implementation.

There has also been a basically negative attitude among department staff toward the turnkey projects. Those remaining in the department regarded their former colleagues at the contractors as a privileged lot who were essentially doing their old jobs at much higher wages. Employees were also conceptually opposed to the system, as it took away the glamorous part of their operations—planning and engineering. Most importantly, however, this attitude prevailed because the turnkey system had, in their eyes, obstructed promotional prospects: The department now no longer needs to expand. These attitudes are alleged to have resulted in deliberate delays in approving plans submitted by the contractors.

8.7 Telecommunications Department

Although privatization was debated widely from 1982, it was only formalized as a government policy in 1985 (see Malaysia 1985). However, it was clear as early as 1983 that the department was targeted as the first public sector organization for full privatization. This was consistent with emerging policy objectives to:

- Reduce the financial and administrative burden of the Government
- Promote competition, increase efficiency and productivity
- Stimulate private entrepreneurship and revitalizing the economy
- Reduce the involvement of the public sector in the economy
- Increase bumiputra participation in the modern corporate sector

Many objections to privatization were encountered among workers of the department. A study was conducted by the government on feasibility and implications. It recommended that the operational functions of the department be transferred to a corporation initially controlled by the government, but that this later be floated on the stock exchange so private investors would ultimately be the major shareholders. While the new corporation would be responsible for its own financial requirements, regulatory functions would be in government hands under a restructured telecommunications department. This followed the model adopted by the British in 1984 very closely.

Following this, the National Action Council recommended setting up a company wholly owned by the government. The proposal was formally approved by the cabinet on March 6, 1984. Subsequently, the Arab Malaysian Merchant Bank was appointed as lead financial adviser to the government. Its main tasks were to set up the terms of reference for the privatization process and to make recommendations on the transfer of the department's operations and assets to the new corporation.

Like many such exercises the world over, this was plagued by problems. There were issues related to asset valuation, organizational structure, and uncertainties over how to transfer workers without infringing on their legal rights as government employees. There was a rift between the workers and the government over the latter's proposal to transfer employees to the Malaysian Administrative Modernization Planning Unit and then reassign them, on a seconded basis, to the privatized company as a way to protect their privileges as government employees. The workers' union claimed that this contradicted the government's previous position, which had been to let employees decide whether they would like to stay in government service or join the new corporation.

Because of all these issues, it was only in July 1985 that bills on privatization of the telecommunications department were tabled in Parliament. By August 1985 the Telecommunications (Amendment) Bill 1985, the Telecommunications Services (Successor Company) Bill 1985, and the Pensions (Amendment) Bill 1985 had been passed.

The Amendment Bill effected the necessary changes to the legislation governing telecommunications and enabled the restructured department to become a regulator while assigning operational functions to the new corporation. The Successor Company Act contained provisions enabling the government to set up a company as the initial step toward privatization. The company, named Syarikat Telekom Malaysia (STM), is held by the government through the Minister of Finance (Incorporated) Act 1957. The act also provided for compulsory employment by STM of staff who opted to join the private company and assigned the assets, rights, and other liabilities of the department to STM.

The Pension (Amendment) Act provides that government servants will continue to enjoy pension benefits even after privatization of their departments. This served to reassure workers of the other departments on the privatization list.

On January 1, 1987, the Telecommunications Department was formally privatized, and its operational functions taken over by STM, with Tan Sri Mohammed Rashdan Baba—formerly the chairman of Guthries Corporation, a large plantation company with wide connections to the manufacturing and service sectors—as its first chairman and Daud Ishak, the former director-general of the department, as its first executive managing director.

In its first year of operations, STM restructured tariffs on both domestic and international calls to more closely reflect relative costs. Domestic calling rates were increased by 30 percent while international call charges were reduced 15–50 percent. This did not result in the expected increase in the number of international calls. Installation and disconnection charges were raised, to the distinct displeasure of users. Subscriber-dialed international calls, per six seconds at the peak rate, cost from M\$0.30 (to Thailand) to M\$0.54 (to Japan). Because there is a high probability calls to Indonesia will not be completed, the person-to-person rate is a 71 percent premium over the usual person-to-person surcharge.

While services have generally improved, the length of the waiting list has not become shorter. Unimpressed by this performance, the government abolished the post of the executive managing director in September 1987 and expanded the post of the chairman into executive chairman with Baba becoming chief executive.

The corporation adopted a more market-oriented approach toward clearing the waiting list. Mobile offices were set up in all new housing estates to register potential subscribers with the aim of providing them service within twenty-four hours where there are existing lines, and within six months where existing lines were completely utilized.

Informal conversations with government officials involved in the exercise indicate several areas of dissatisfaction with the model of privatization adopted.

First, the 1987 transition merely involved transfer of a monopoly from one government entity to another. There was no private infusion of capital. For all intents and purposes, STM is just another public enterprise. Under such circumstances, the extent to which private sector culture and mentality can be instilled is doubtful.

Second, because STM retains a monopoly on the domestic and international network, it is unclear to what extent STM will be compelled to improve the efficiency of its delivery system. It is only in the peripheral areas of network services—such as public telephones, paging, and data base services—that third-party vendors are allowed. They must operate under license from STM, which severely controls the extent to which they can respond to market signals.

Third, no one has resolved the issues related to the trade-offs between profit motive and social responsibility. While focusing on increasing telephone density in urban areas, rural networks have been essentially neglected. There have

been increasingly frequent complaints from rural users about STM neglect, and it is imperative that the corporation formulate and implement a coherent and just policy of cross subsidy between urban and rural subscribers. The ATUR program is a clear example. The initial rationale was that it would bring telephone services to isolated rural settlements that have not been linked to the microwave network. However, expensive installation charges for ATUR mean it is currently utilized only for business on car phones. (Installation charge for an ATUR telephone is M\$6000, about 1.5 times 1987 per capita income.) Some form of cross subsidy program should be formulated to enable the truly needy isolated rural settlements—such as those in the east coast of peninsular Malaysia, Sabah, and Sarawak—to benefit from ATUR.

Telekom Malaysia was listed on the Kuala Lumpur stock exchange in November 1990, after 13 percent of the shares were sold to the general public. Stock also was sold to STM employees and to bumiputra institutions. As a result, the government (with the institutions) holds 81 percent of the shares. The company earned M\$563 million (U.S.\$203) in 1990.

8.8 Prospects

Malaysia will remain an open economy with increasing emphasis on private sector participation, particularly from foreign investors, in implementing economic growth. To be attractive to investors, Malaysia's infrastructure facilities, especially its telecommunication network, will have to remain among the best among developing countries. In the Fifth Malaysia Plan, 1986–1990, the sector was allocated a massive M\$9.6 billion for capital expenditures. This is over and above what STM can provide.

With this extra allocation, telecommunications in Malaysia will continue to expand and improve. In the late 1980s services such as ATUR, facsimile, Dattel, MAYPAC, and MAYCIS were introduced. These have met with good public acceptance and utilization. Further changes in services will be effected. The earth satellite station in Kuantan will be replaced by a digital fiberoptic submarine cable, upgrading the quality of international services. A Kuantan–Kota Kinabalu fiberoptic link was commissioned in 1989, and construction has begun. When completed it will give the country, in conjunction with a link to Manila or Hong Kong, broad access to the U.S. west coast and Japan. A new digital microwave network will be installed by the early 1990s, resulting in establishment of ISDN and Intelsat Business Service (IBS). The IBS medium can transmit digital voice, data, fax, and video teleconferencing at speeds of 5,600 to 2 million bps.

An ambitious program for provision of digital circuits on land was underway in 1992. Involved are 4 million lines, which will cost some \$M2 billion (U.S.\$780 million). When finished in 1997, 80 percent of the country's transmission network will be digital. These circuits are capable of transmitting up to 2 Mbps with lower error rates than 9,600 bps on existing analog circuits. To complement the digital distribution network, the microwave network will be upgraded at a cost of M\$460 million. This five-year turnkey project has been described

as the final phase in the department's master plan to extend, upgrade, and modernize domestic and overseas telephone services. The projects involve the cooperation of experienced international contractors. To the surprise of many five companies were each awarded 800,000 lines in March 1992. As with the earlier turnkey project, political and other controversy surrounds the plan. (See the discussion in Chapter 7.)

Malaysia's ability to attract foreign businesses and remain an efficient place to work and live depends on easy availability of telecom services. It thus is essential that clearing the waiting list and providing telephone, telex, and facsimile services within several days to those who want it be achieved in the foreseeable future. Steps to do this include better coordination between STM, its contractors, the restructured telecommunications department, and other authorities.

In addition to emphasizing improvement in the quality of services, the government should also extend its scope of coverage. In fact, expanding telephone coverage by the year 2000 should be made a primary goal. To do this the government could consider liberalizing the sector and allowing more third-party vendors into value added services. For example, specific regional companies could be given permission to provide services, particularly to rural areas, with the government providing fiscal incentives to enable companies to recover their costs and make a profit.

Whatever happens in Malaysia, the government is going to be involved. Real privatization in which companies can compete on price and service within broad regulatory bounds is simply not going to happen anytime soon, if ever. The perceived social necessity of protecting ethnic interests is simply too strong. Government still thinks it must make policy in very specific areas—if not indicative planning by a Malay elite with the omnipotence attributed to Japan's MITI in its heyday, then at least continued attempts intended to make Malays the economic equals of Chinese and Indians through a tilting of the playing field. Thus, as telecommunications is merged into the broader concept of information technology (IT), some see it as imperative that the Malaysian government formulate a comprehensive national policy specifying the strategy for the adoption and assimilation of IT into its manufacturing, plantation, and service activities.

For several centuries, Malaysia's rulers—whether British or Malays, sultans or civil servants—have assumed ethnic Malays cannot or will not help themselves economically: things have to be made easy for them. There is an emerging entrepreneurial class that recognizes this for the insult it is. Liberalization of value added services and other areas of telecommunications that have been shown elsewhere as capable of supporting many relatively small competitors just might give them the opportunity they really need.

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