CHAPTER IV

TELECOMMUNICATION PRODUCTS AND SERVICES

The products and services that will be discussed are dependent on what the companies have and the type of licences that they were awarded by Jabatan Telekom Malaysia. The progress and development of the products and services will be considered and evaluated. Some of the products and services are the fixed telephone services, public payphones, ISDN, and mobile telephone services. These services are to complement each other and to create a healthy competition in the telecommunications industry. Most of all, they are to assist in Malaysia economic progress and development and to achieve the country's "Vision 2020" objective.

Satellite System Services

A RM 40 million contract was signed in 1986 with a local consortium to build a new earth station in Kuantan. This is to replace the existing station and was commissioned on 6 April 1970. This contract also covered the supply of Time Division Multiple Access equipment at the Melaka earth station. This Kuantan earth station continues to provide international telephone telegraph and telex links (Telekom Malaysia Berhad 1986). The opening of the Kuantan 2A satellite earth station in November 1988 marks another important step forward. It fulfilled TMB's objective to provide Malaysian advanced and sophisticated telecommunications services. The Kuantan 2A satellite stations has incorporated the latest design and technology was geared for the eventual shift from

conventional analog technology to the latest digital technology (Telekom Malaysia Berhad 1993a).

Technology Resources Industries Berhad (TRI), the parent company of CELCOM will soon be launching the first ever global personal message communication satellite this year 1995. This particular venture will be a world's first, enjoying a five year head start over other similar satellite system. Malaysian will then have access to the cutting edge of telecommunication services such as personal message communications, data communications, geographic positioning, marine communications, cargo tracking, remote asset monitoring and remote data collection (Celcom Antenna Magazine 1994a).

Malaysia East Asia Satellite (MEASAT-I)

Binariang was awarded a complement of licenses by the Government to develop an integrated network capable of providing a range of advanced information, communication and multimedia services. In addition to GSM cellular licence, the company has also been licensed to operate the country's first satellite, the Malaysia East Asia Satellite (MEASAT-I); a domestic network and international gateway. The satellite is now scheduled for launch in late 1995. Malaysia is expected to save RM 35 million a year from satellite rental once MEASAT-I is launched (Jabatan Telekom Malaysia 1993).

Cable Network

A total of 452,815 effective cable pairs was installed during the year 1986. The year 1986 marked the beginning of a five year program in the setting up of a national digital transmission network. It covered 47 microwave routes stretching over 5,801 Km and 180 stations. Eight 140 mbit/s links have been completed, mainly in the Central Region. A total of 93 optical fiber cable routes was also planned, completed and

implemented. Three coaxial cable routes comprising two in the Central Region and one in the Southern Region were also installed. The junction cable program saw the completion of 26 projects throughout the country, contributing 11,136 additional circuits. There were 159,150 trunk and junction telephony circuits as at end of 1986 distributed over 716 trunk routes and 1,184 junction routes (Telekom Malaysia Berhad 1986). Fiber optics program began to take off in 1993 with projects valued at approximately RM 240 million being implemented. The most significant, the 1,000 kilometers 565 MBps cable running from Kangsar to Kuala Lumpur to Johor Bahru was completed in May 1993. Within the Klang Valley, the high traffic routes were identified for fiber deployment and the necessary civil works were completed. The fiber link to the East Coast of Peninsula Malaysia running from Segamat to Teruntum (near Kuantan) was completed as well. It continued the extension to Kuala Terengganu and Kota Bharu. Traffic growth between Peninsula Malaysia and Sabah and Sarawak has led to the exhaustion of capacity reserved for domestic use in the Kuantan to Kota Kinabalu optical fiber cable that was commissioned in 1991. Following a route survey that was completed in 1993, the tender for a 3x5 Gbps optical fiber cable connecting Mersing in Peninsular Malaysia and Sarawak, Labuan and Sabah was called in 1993. The cable pair seemed to be ever increasing. It was 13,482,000 kilometers in 1988 and in 1993 it has increased to 20,430,000 kilometers (Telekom Malaysia Berhad 1993a).

Besides TMB, Sapura has been in the cable network operation for 18 years now. The SAPURA's cable network installation operations have earned it a reputation for competent project management and network implementation through their successful handling of the local area network for Telekom Malaysia Berhad. This reputation served the corporation well in its future participation in new areas and ventures. It successfully secured cable network installation projects in Brunei Darussalam and Medan, Indonesia, worth RM 53 million and RM 60 million respectively (Sapura Telecommunications Berhad

1993/94). The projects are progressing on schedule. SHSB hoped that these ventures will be the springboard for the company's future ventures into the international market.

Sapura Holdings Sendirian Berhad has maintained its involvement in cable network installation. Upon completion of the Full Turnkey Project through the Jadual Kadar Harga (JKH) scheme set up by Telekom Malaysia Berhad, it continued in cable network installation services. To complement the JKH operations, the it made new inroads by installing power cables for Tenaga Nasional Berhad and optic fiber cables for Time Engineering Sendirian Berhad. Two new divisions were established - the Power Engineering Division and the Network Engineering Division - to implement the above projects. The deliveries of the cable network installations have been as scheduled. These have been made possible with the experience and expertise accumulated over the years.

International Voice, Image, Video and Data Transfer Services

TIME has been awarded a telecommunications licence to handle international voice, image, video and data traffic. It has planned to install a terrestrial and submarine fiber optic cable telecommunications network across the Malaysian-Thailand border (A. Rachel 1994).

> "Once both the networks are connected, it will pave the way for increased volume in telecommunication traffic between the two countries, especially for commercial purposes" said Mohd Jaafar Ismail, managing director (A. Rachel 1994).

Submarine Cable

The cable totaling 1,624 Km will be installed around the Peninsular and wil comprise 19 segments and 25 landing sites. The first leg of the cable will connect Pula

Langkawi to Kuala Lumpur. The total cost of the project is estimated at RM 160 million. The work will begin at the end of the year 1994 and expected to be completed within a year. The submarine fiber optic network is part of a telecommunication project. Its total costs of which is estimated at RM 880 million to be spread over 5 years' period. Out of the total amount, RM 220 million months will be used for the current project that is expected to be completed within the next 12 months (Pyramid Research 1994)

The new network is an extension of the company's fully digital optic fiber cable network which covers the North-South expressway and the submarines festoon system along the coast of Peninsular Malaysia. In addition, Time Telecommunications has launched its fully digital lease line services on December 1, 1994. The services used the latest state of the art synchronous digital hierarchy transmission technology and have a flexible and versatile centralized system (A. Rachel 1994).

Integrated Services Digital Network (ISDN)

ISDN is a multi-task system that incorporates video display, facsimile transmission, telephone and data transmission via a single terminal. International ISDN service was introduced in response to the needs of customers for high speed, high quality and 64Kbps switched digital service (Rodhiah Ismail 1991). ISDN provides customers with a myriad of applications by combining voice, data, text and image communication. ISDN was introduced in the Klang Valley on July 7, 1994. Malaysia's integrated services digital network (ISDN) is now linked with the United States. The link is the third after Japan and Singapore. The link would provide a more effective telecommunications network between Malaysia, the United States and other part of the world (The Star 1994a). Teleconferencing between Malaysia and other parts of the world would help multinational corporations (MNC) in Malaysia increase efficiency. Telekom Malaysia has

planned to extend its ISDN to Europe, Hong Kong, and Australia by the end year 1994 (Telekom Malaysia Berhad 1993a).

International Gateway Mobile Telephone Services

International services are available through CELCOM'S own international gateway that will ultimately offer the capability to simultaneously transmit voice, data and images around the world. The gateways that have already been established with overseas countries are Britain, Canada, the United States, Japan, the Philippines, Singapore, and Thailand (Rodhiah Ismail 1994b). Through such linkages, overseas calls to and from its ART 900 mobile telephone service could be routed through its own international gateway rather than through third carrier networks' facilities, like Telekom Malaysia Berhad's (The Star 1995a). The other new international phone-linked services include toll-free services, calling card, home country, direct service, private leased circuits, virtual private network and" store and service" fax facility will be introduced in stages. The calling card and home country direct service allows callers to place an international call from any telephone and charge them to the subscribed card or home number respectively. The virtual private network would work on the same principle as the private leased circuits, but charges will be made only on the duration of the calls while the latter will have fixed monthly charges. The store and service fax facility will receive faxes on behalf of the subscriber and send it later to any international destination the subscriber wishes. Celcom is seeking to have at least 10 international direct telecommunications links by the end of the year 1995 (New Straits Times 1994c).

Deputy Energy, Telecommunications and Posts Minister Datuk Mohd Tajol Rosli said the CELCOM international link-up was not only another milestone in the history of telecommunications in the country but also provides yet another fine example where countries in Asia Pacific can obtain mutual benefits through collaboration and cooperation.

The Government welcomed the move as it is mutually beneficial. "We are aware that global interdependence is very much a reality today with the focus being on strategic alliances and regional cooperation, a pooling and sharing of strengths and expertise for the common good," Tajol said (Rodhiah Ismail 1994a).

Mobikom has in its first year of operation commenced international roaming services to Australia and New Zealand, Sri Lanka, Hong Kong and Thailand. This enables its Mobifon 800 subscribers to use their telephone in these foreign countries. The company was also carrying out discussions with Singapore and Brunei. The next batch of countries would be Indonesia, the Philippines, Taiwan, South Korea, Chile, Mexico, the United States and Canada (The Star 1995d). STW and Punca Mutiara Sdn Bhd had applied for an international gateway licence to enable it to carry overseas call traffic (Azrin Azmi 1994b).

International Telephone Exchange Network

The old International Telephone Exchanges and the Telephonist Assistance Center in Kuala Lumpur were closed on January 15, 1986. All international telephone services were transferred to the new International Telephone Exchange in Kuantan and to the International Telephonist Assistance Center in Kuala Lumpur. This transfer has completed the final phase of the Second International Telephone Exchange project. The international telephone services have greatly improved with the additional capacity and capabilities. At the end of 1986 a total of 595 international and 791 national circuits was put into service (Telekom Malaysia Berhad 1986). The investment in facilities to provide capacity for growth and establishing diversity to cushion the impact of disruptions continued to be the thrust of international activities. This effort together with the resulting improvement in service quality has provided the impetus for growth in usage of services of which International Direct Dialing (IDD) is the most important.

The US 335 million APC Cables in which Telekom Malaysia Berhad's investment share is 10.7 per cent, were completed in August 1993 and were officially launched on November 9, 1993. The launch of this cable culminates the effort of telecommunication organizations in East Asia and 37 others that began in August 1990 with the signing of a Memorandum of Understanding. It was launched in November 9, 1994 (Telekom Malaysia Bulletin 1994). The 3 x 560 Mbps 7,516 km optical fiber cable can be considered the optical "Super Highway" - longest in the region - in East Asia with landing points in Japan, Taiwan, Hong Kong, Malaysia and Singapore. It is also a reflection of the growing economic linkages in East Asia and the ultimate influence on demand for high quality voice, video, and data services. The link marks another milestone in global connectivity. The total international telephone traffic volume including calls to Singapore increased to 626 million minutes compared to 452 million minutes in 1992, a growth of 38 per cent (Telekom Malaysia Berhad 1993a). The total minutes to Singapore experienced a higher growth than the growth to other international destinations. Home Country Direct Service was introduced in Spratley Island to boost aqua-tourism in the South China Sea. Services to Peninsula Malaysia and Sabah and Sarawak were also improved to attract Malaysia tourists to Spratley Island. Telekom Malaysia Berhad's international gateway exchange has increased from 5,500 in 1989 to 11,100 in 1993 as indicated in Table 4.2 below.

Telephone Network Development

At the end of 1986, Malaysia's telephone exchange total capacity was 2,081,240 lines. This represented an increased of 18% from the previous year. This increased was resulted from the commissioning of 37 new exchanges, the expansion of 15 existing exchanges and the replacement of 54 old exchanges. Computerized exchanges now constitute 68% of the Malaysian switching network (Telekom Malaysia Berhad 1986). The first three Centralized Maintenance and Operation Centers (CMOC) were

commissioned in the Central, Eastern and Sarawak Regions. These centers helped to streamline and increase the efficiency and effectiveness of switching maintenance activities (Telekom Malaysia Berhad 1986). The network capacity has recorded an increasing trend. The exchange line in 1988 was then 2,389,000 as compared to 3,826,000 in 1993. The From 1989 to 1993, mobile exchange line has increased from 50,000 to 127,000. Likewise, the international gateway exchange has increased from 5,500 in 1989 to 11,100 in 1993 as illustrated in Table 4.1 below.

TABLE 4.1

TELEPHONE NETWORK CAPACITY

Network Capacity ('000)	1988	1989	1990	1991	1992	1993
Telephone Exchange Lines	2,389	2,460	2,506	2,701	3,201	3,826
Mobile Exchange Lines		50	60	92	120	127
International Gateway Exchange		5.5	5.5	5.5	11.1	11.1

Source: Jabatan Telekom Malaysia 1993 Annual Report and Telekom Malaysia Berhad 1993a Annual Report

Telephone Services

Malaysia has entered into an era of high telephone growth rate following a consistent high economic growth which began in 1988. Telecommunications in Japan underwent the same phase during the 1960s and 1970s following a period of high economic growth in 1950s. The number of telephone lines increased from five million in 1950s. The number of telephone lines increased from 5 million in 1962 to 35 million in 1977, seven-fold in 15 years. South Korea is already in that phase with a number of

telephone lines increasing from 4 million (equivalent to a penetration of 10) to more than 13 million (a penetration of 31) in 1990 (Syed Hussien Mohamed 1991).

The Malaysian telephone penetration, that is the number of telephone line per hundred population in 1989 was 8.0 and has been increasing. The total access line has increased to 8.9 in 1990, 9.9 in 1991, 11.6 in 1992, and 13.1 in 1993. Correspondingly Telekom Malaysia's telephone service is growing too. Telephone service grew from 15.3 percent in 1993 to 2,410,721 lines (1,737,750 residential and business 672,971), as compared to 15 per cent for 1992 (residential 1,540,480 and business 587,089).In the year 1989, the number of line was only 1,388,183 (residential 990,335 and business 397,848). In 1988, number was only 1,247,687. The growth in the residential segment continued to be stronger in terms of lines, registering a growth of 15.5 per cent compared to 14.6 per cent in business. The growth helped to push the telephone penetration to 13 telephone lines per 100 population by the end of 1993 (Telekom Malaysia Berhad 1993a). It did not stop there, instead the telephone density rate as per 100 people has reached 14 per cent (Rodhiah Ismail 1995).

The capital expenditure program, of which the network components are the largest, increased to RM 2.7 billion in 1993. Problems of cable supply became less of a concern with better coordination and higher production capacities. Increased in network capacity in the local switch and transmissions were significant and overall digitalization was raised as well (Telekom Malaysia Berhad 1993a). Telekom Malaysia Berhad has been improving its quality services. This was recorded in the total faults per line report and total complaints per 1,000 lines received. The total fault was 0.79 in 1989 and has dropped to 0.67 in 1993. The total complaints have dropped from 30.9 in 1989 to only 7.2 in 1993. That is a good indicator of improved and high quality services provided by TMB (Jabatan Telekom Malaysia 1993). The overall progress is showed in Table 4.2 below.

Table 4.2

TELEPHONE SERVICES AND QUALITY SERVICES

Descriptions	1988	1989	1990	1991	1992	1993
Residential Telephone	884,138	990,351	1,135,954	1,298,741	1,504,480	1,737,750
Business Telephone	363,549	397,848	449,790	518,109	587,098	672,971
Total Telephone	1,247,687	1,388,199	1,585,744	1,816,850	2,091,578	2,410,721
Quality Services						
Total Faults Reported Per 1,000 Lines	0.93	0.79	0.76	0.78	0.78	0.67
Total Complaints Per 1,000 Lines	41.9	30.9	19.9	14.7	8.8	7.2

Source: Jabatan Telekom Malaysia 1993 Annual report and Telekom Malaysia Berhad 1993a Annual Report.

Smartfon (CT2)

The second generation digital cordless telephone technology, CT2 was introduced into the country in the year 1989. It did not start until the year 1992 and recorded 4,596 subscribers (Jabatan Telekom Malaysia 1993). The smartfon customer base increased to 6,902 in 1993. The number of base stations was expanded from 3,000 to 4,000 and the service was introduced to Sabah and Sarawak with an additional capital expenditure of RM 56 million (Jabatan Telekom Malaysia 1993). Table 4.3 below summarized its progress.

Public Payphones Services

The public payphone services rendered by Telekom Malaysia Berhad and SHSB's subsidiary, Uniphone Telecommunications Berhad (UTB). TMB is responsible for the rural areas and UTB is responsible for the urban or town areas. Over the next few years, however, Telekom Malaysia is expected to narrow the gap. Their activities included the installation and maintenance of public payphones, both coin-operated and card phones throughout Malaysia. UTB The payphone services have been and are constantly being upgraded (Uniphone Telecommunications Berhad 1994). Installations have increased to ensure penetration into areas where there is increasing demand. The total public payphones in Malaysia has increased from 21,456 in 1988 to 46,212 in 1993 and 65,000 in 1994. About 18,000 units are expected to be installed in 1995 and 1996. The Table 4.3 below showed its progress and improvement (Jabatan Telekom Malaysia 1993).

Table 4.3

PUBLIC PAYPHONES AND CT2 SERVICES

Descriptions	1988	1989	1990	1991	1992	1993
Public Payphones	21,456	22,353	24,591	27,750	34,549	46,212
CT2 - Smartfon	0	0	0	0	4,596	6,902

Source: Jabatan Telekom Malaysia 1993 Annual Report.

ATUR 450 Services

The ATUR 450 Service, which came into operation in the Klang Valley in January 1985. It was fully commissioned throughout the country in March 1986. To meet the high

demand, particularly in the Klang Valley, the expansion of the service was initiated in October in 1986 using the "Small Cell" concept to accommodate more subscribers by reusing groups of frequencies more effectively. The project was completed in 1987 and cost RM 11.6 million (Telekom Malaysia Berhad 1986).

Since it became operational, ATUR 450 customer base has been growing at readily speed. The growths in its customer base are as follows: 27,037 in 1988, 39,419 in 1989, 54,616 in 1990, 70,917 in 1991, 83,118 in 1992 and ATUR 450 has reached a customer base of 89,028 at the end of 1993, a 7.1 per cent higher than a year ago (Jabatan Telekom Malaysia 1993). Although this service is reaching its maturity phase, Telekom Malaysia Berhad believed there is still room for growth and continued to invest in the network to improve coverage. The numbers of channels have increased to 6,000 to raise maximum customers' capacity of 120,000 (Telekom Malaysia Berhad 1993a). Table 4.4 below has the details.

ART 900 Services

In just five short months, CELCOM has successfully set up the Automatic Radio Telecommunications network or ART 900 system. It is a technologically advanced and fully operational cellular network. It was the fastest time ever in the world for a project of this magnitude to reach its fully operational stage. Furthermore, this was accomplished with only minimal use of foreign expertise during the inception stage (Celcom IRM 1994). The ART 900 operates on the 900 MHz frequency band. It was established with the aim of overcoming the capacity limitations of the ATUR 450 system and to satisfy all future market demands.

ART 900 has changed the way Malaysians communicate and run their business. CELCOM's ART 900 service currently operates in the analog mode. To date, it has slightly more than 450,000 subscribers in 1994 and satisfied 80% of the market needs

(Celcom IRM 1994). The ART 900 network currently has an installed capacity for 470,000 subscribers. It is more than one tenth the size of Telekom Malaysia's fixed-line network. Telecoms analyst Adam Quinton of UBS Securities expects CELCOM's subscriber base to double by the end of 1995 and top 1 million by 2000. He says the company, which also operates long-distance and international services, are well on its way to being a full-fledged second carrier to Telekom Malaysia Berhad (Mark Clifford 1994). In fact, CELCOM has started the work on building up the network for digital service to overcome its capacity was as scheduled. Its new digital mobile phone network was based on digital technology adopted by more than 40 countries. It will then offer customers the possibility of roaming in these countries and will provide the platform for new services, such as data and facsimile transmission as well (Celcom IRM 1994).

To complement the system, CELCOM offered a numerous value-added services. These included the Interactive Voice Response services and Voice Information Services such as telemarketing, televoting, telepolling and teleresearch. The most popular service was the telemanager. It is similar to an electronic-mail system, except that users need to use their ART 900 cellular telephone. The telemanager offered various capabilities such as automatic storage of messages for later retrieval (Press Release 1994). The second type of services offered is the voice information services. The voice information service was similar to bulletin boards, except that users also need their ART 900 cellular telephone. It allowed users to call-in for the latest updates on traffic conditions, weather reports and even horoscopes. Also, an advanced wireless data communications network is available for subscribers. It offered a unique service that includes 2-way messaging and wireless stock market reports (Celcom IRM 1994). This system is to enhance the productivity of personnel in the field, cost effectiveness, efficient communications, streamlined administration, improved safety, and increased profitability. An application example is database inquiries from employees in the field to obtain information from central computers, reporting, and messaging. Further, CELCOM also offered a solution to those

needing a stock-monitoring service that provided stock information direct from the Kuala Lumpur Stock Exchange (KLSE). Its Wireless Stock Data On-line or WISDOM, is a public data service that transmits the latest stock information from KLSE via BERNAMA. WISDOM's wireless capability gave the subscriber complete mobility and flexibility. Furthermore, WISDOM is very user-friendly, because it is a Window-based computer software (Celcom WISDOM 1994). The progress and development of ART 900 can be seen in Table 4.4 below.

TABLE 4.4

CELLULAR MOBILE TELEPHONE SERVICES

Description	1988	1989	1990	1991	1992	1993	1994
ATUR 450	27,307	39,419	54,616	70,917	83,118	89,028	
ART 900		6,626	23,315	60,761	123,330	251,046	450,000
MOBIFON 800							32,000
GSM 900							N A
PCN							N A

Source: Jabatan Telekom Malaysia 1993 Annual Report, Celcom IRM 1994, Mobikom 1994.
NA = Not Available Yet.

Celcom Continuous Improvement Programs

A present-day projection of RM 50 billion has been earmarked to support the drive for increased telecommunications facilities in the country over the next few years. The priorities have been clearly enunciated: the ongoing upgrading of technological

capabilities, the development of new value-added services and, above all, the development of skilled manpower. Technology Resources Industries Berhad (TRI), the parent company of CELCOM is focused unerringly on the future. From early beginnings in a variety of industries, today it's a company concerned single-mindedly with just one: telecommunications. "Vision to Succeed," the theme chosen has driven TRI into its new direction. It reflected the company's aim to play a leading role in the development of the nation. The results were self-evident. It was to TRI's credit that much of Malaysia's growth and achievement in communication was sparked off by the company. In the process, in a relatively short period of time, TRI had established for itself a formidable presence in Malaysia as one of the ten largest and most significant companies in the country (Technology Resources Industrial 1994).

Mobifon 800 Services

Mobifon 800 is Malaysia's latest and most innovative mobile phone service. It is operating in the 800 MHz width length. It was the first phone system in Malaysia that gave subscribers the choice for both analog and digital services. In fact, it was the first digital service offered in Malaysia. The digital channel offered clarity, interference-free conversation and security (Lashvinder Kaur 1995). Mobifon 800 cellular phone service operator MOBIKOM has achieved its subscriber base target of 30,000 on December 31, 1994, six months after the launch of the service. It has 32,000 subscribers now and expects to achieve 100,000 subscribers in 1995 (Lashvinder Kaur 1995). It has an average of 5,500 subscribers per month signing up for the service since it started but it was doubled in December 1994. As remarked by MOBIKOM chief executive officer that it will ɔe able to break-even in 1996 (Lashvinder Kaur 1995).

"We would be comfortable with 130,000 subscribers and would be able to break even by the first quarter of 1996. However, this depends on the average bill per month per subscriber," Mobikom Chief Executive Officer Zamani Zakaria said (The Star 1995b).

Such an achievement was set to place Mobikom as a competitor that the industry can reckon with, in the wake of the marketing blitz undertaken by its presently number one competitor, Cellular Communications Networks Sdn Bhd (The Star 1995b). MOBIKOM would like to offer fixed wireless phone services soon. This service could be used in new housing estates, and it could also offer back up services for the banking industry, emergency purposes and even at construction sites (The Star 1995b).

GSM 900 Services

Binariang Sdn Bhd has received licences to operate nationwide cellular telecommunications services and international network (gateway) and services in the year 1992. The scopes of services are to provide Digital Cellular Services using GSM 900 MHz system and MEASAT-I in correspond to its awarded licenses. It is developing an integrated digital wired and wireless telecommunications network. It is expecting to launch the nation's fourth mobile cellular telephone service in June 1995 The cellular telephone system is the Global System for Mobile Communications (GSM). It is operating in the 900 MHz frequency (GSM 900). GSM 900 will be the nation's first fully digital service giving clearer transmission and reception. The service is expected to cover the whole of Peninsula Malaysia upon its launch (Azrin Azmi 1994a).

GSM is the latest in mobile telecommunications technology that's conquering the international world of business. It is a superior digital system for voice, and data transmission. GSM system allows the mobile telephone to display text messages and have each individual calls to be billed to his or her own account whether he or she uses another

person's mobile telephone or his or her own telephone while abroad. (Celcom Antenna Magazine 1994a). GSM is the only digital system that is widely accepted and deployed around the world. It is now the chosen digital cellular technology in over 80 countries in four continents and is set to be the World's dominant cellular technology for the rest of the 1990s. For the first time GSM offers the possibility of cellular roaming not just in Europe but across continents. A hugh growth for GSM networks and services worldwide is expected in 1995. Existing GSM networks will continue to expand and large new networks will be brought into service. Many of the new high-volume markets for GSM will be in Asia-Pacific, Africa and the Middle East. GSM networks have grown steadily with a 500 per cent increase in subscribers from a mere 200,000 in December 1992 to a present day international community of 1.2 million (New Straits Times 1994a). The BINARIANG's GSM service would offer a new level of voice quality, easy network access and special voice and data features (GSM Program 1995).

Fixed Wireless Local Loop (WLL) Services

STW's WLL cellular service is using the Radio in Loop (RiLL) technology that provided speedier installation of telephones. It can be used in new housing areas where it would take time to provide regular telephone services. Subscribers will need to use special wireless telephone sets, linked via radio waves to an exchange operated by STW. This in turn is linked to the other telecommunications network operated by other companies such as Telekom Malaysia Berhad, Cellular Communications Network (M) Sdn Bhd, Mobikom Sdn Bhd and Binariang Sdn Bhd. Unlike conventional mobile telephones, the sets can be used only within 25 km radios from the subscribers' terminals, located either at their homes or offices. It has been reported that STW is planning to build up its nationwide network in ten phases over the next five years. Phase one, involving an investment of about RM 20 million, will cover the rural and semi-urban areas of northern states of

Kedah, Perlis and Penang. In September 1994, STW awarded a US 477 million (RM 1.3 billion) contracts to Ericsson Telecommunications Sdn Bhd for the design, supply, installation and commissioning of its network (Azrin Azmi 1994b).

Cellular Personal Communications Network Services (PCN)

Three different companies have been given licences to operate the new cellular personal communications network services. These companies are Electronic & Telematique (M) Sendirian Berhad, Malaysian Resources Corporation Berhad, and Punca Mutiara Sendirian Berhad (Azrin Azmi 1994b). However, this PCN service is not available yet as the licensees have just begun their activities. It is not known exactly when this service will be operational. In according to SHSB's official that the PCN service is based on the 1,800 MHz band. The distances between stations for its transmissions have to be nearer and therefore will be more costly to install and operate this service. He said SAPURA's subsidiary has just begun to plan and implements this service by targeting forty suitable sites to setup its stations in March 1995. Punca Mutiara Sendirian Berhad has started its site locations for their stations in Klang valley in the beginning of January 1995.

Other Services

There are many more specific types of telecommunication services available in Malaysia were not discussed. Trunked Radio services, Paging services, and Radio Leased Channel services are some of services not discussed. Also, the services offered by Telekom Malaysia Berhad that are not discussed are Telex service, Facsimile service, Leased Circuits service, Malaysian Circuit Switch Network (Maycis), Video text service (Telita), Malaysian Packet Switched Public Data Network (Maypac), Toll Free service (800-

service) and Telemail. The Table I at the appendix has recorded the number of subscribers from the year 1989 until 1993. The figures indicated that these services are not very popular yet. In fact, telex subscribers have been decreasing.

Advertisements and Promotions

Out of the marketing mix, the telecommunications companies can only be able to use product mix and promotion mix effectively. The place mix for service coverage and the price or rate are very much regulated and controlled by the authority. Telekom Malaysia Berhad and the major private telecommunications companies are spending a lot of effort, time and money in their advertisement and promotion programs. Their advertisements are very much focused on their products and services benefits as well as their corporate image.

Telekom Malaysia Berhad has continuously been putting efforts in advertising in local television networks and newspapers in creating awareness and building its corporate image. The advertisements are normally placed during festive seasons like Chinese New Year, Hari Raya Puasa, Deepavali, Christmas and New Year day. The media it uses are TV1, TV2, and TV3 channels, Radio1, Radio3, Radio4 and Radio5, as well as local newspapers nationwide (Telekom Malaysia Berhad 1994 - Bulletin).

It had ATUR 450 promotion from January until February 12, 1994. In March 1994, Telekom Malaysia Berhad has started Smartfon promotion for new users by reducing Smartfon unit to RM 298.00, reducing monthly rental to RM 18.00, giving free registration, free "messaging" smartfon service and free two months' rentals. In April 1, 1994, onwards, telephone and ATUR reconnection have been reduced from RM 50.00 to RM 10.00. Telekom Malaysia Berhad had "Radio Talk Show" at Radio3, Ibukota. The topics discussed were Museum Telekom, Telephone Billings, Telephone details, Autopay, telephone directory and public telephones. In May 1994, Telekom Malaysia Berhad had

an incentive for additional lines for business by waiving installation and initial deposit for the additional lines. The incentive period was between May 1 to August 31, 1994. On May 1, 1994, it started a contest promotion which was targeted for business, private, ATUR 450, and smartfon. When every RM 100.00 spent on telephone services between June 1 to August 31, 1994, the clients are entitled a "Peraduan Dunia ATD" form. Telekom Malaysia Berhad had participated in ITX 1994 exhibition at Putra World Trade Center, Kuala Lumpur. The products exhibited were ISDN, Video-conferencing, Smartfon, ATUR 450, VSAT and others (Telekom Malaysia Berhad 1994 - Bulletin)

Telekom Malaysia Berhad had special rates for ATD and STD promotion during major festive seasons like Chinese New Year and Hari Raya Puasa for its subscribers. The rates were one-third and fifty percent discounted respectively. Further, it had STD midnight call promotion in March 1994 where the discount was up to eighty-three percent (depending on distance and duration). The midnight call promotion was extended to June 1994 and to August 31, 1994 (Telekom Malaysia Berhad 1994 - Bulletin).

SAPURA's marketing division performed credibly too. Operating a nationwide distribution network through the Kedai Sapura outlets, the company was able to penetrate a larger market area. A larger target group of consumers were exposed to SAPURA products through aggressive marketing strategies and reliable after-sales service. This resulted in the company securing a larger market share. While noting the success of its marketing strategies, the company will endeavor to upgrade the range, quality and reliability of its product lines to keep pace with technological advances in the telecommunication sectors. The company will achieve these aboration programs on product improvements and research and development with a related company (Sapura Telecommunications Berhad 1993/94).

CELCOM has intended to move away from being just a cellular communications company to one that is solution-oriented, offering total telecommunications services. The company will launch several new telecommunications products and services in 1995. It has

introduced the revolutionary offer that allows anyone to enjoy the full advantages of a mobile phone when he or she needs one, and the freedom to give it up when he or she wants. CELCOM has started the Art 900 Express for the convenience subscribers to pay their monthly bills by means of Drive-through Express payment box (Celcom Antenna Magazine 1994a). CELCOM has been advertising and promoting its corporate image, services and products throughout the year in all major mass media. It has aggressively advertised that only ART 900 has the power and facilities for ART 900 subscribers to be able to communicate in foreign countries (The Star 1994b). CELCOM has introduced a "Sundown Discount Scheme" promotion on November 15, 1994. This promotion will last for three months. It provides the ART 900 subscribers opportunity to save 50 per cent when they call between 6pm and 7am. On top of that the ART 900 users will be given a further discount of up to 15 per cent on local calls (Celcom Antenna Magazine 1994b). The latest promotion was free call between ART 900 and ART 900 on 30 and 31 January 1995 (The Star 1995e). CELCOM has a branches and "one-stop" service center throughout the country. It works very closely with hand phones dealers to provide sales and services to the ART 900 subscribers.

MOBIKOM has introduced an "early bird" program that gave potential subscribers the opportunity to try out the Mobifon 800 service without any commitment to purchase the phone or subscribe to the service. The program has certainly helped the company to promote its service, hence meet its target, as customers are given hands-on experience of using the service. MOBIKOM has also actively engaged in attractive marketing promotion activities and recently introduced its nationwide Golden Harvest promotion where subscribers have to pay only RM 116 instead of the normal RM 466 for registration (Lashvinder Kaur 1995). The latest was "Ang Pow 'Windfall' " promotion, where no deposit, no connection fee, and no registration fee was charged. This promotion also offered 50% discount for all calls made within Malaysia between 6pm to 7am (The Star 1995c). MOBIKOM will spend RM 26 million on advertising and promotions this year

1995 to ensure that it has the competitive edge over the other players in the market. The company has also plans to expand into data communications by offerings a wide spectrum of services (The Star 1995b). Further, MOBIKOM has spent RM 2 million to set up 17 branches nationwide. It has also arranged with hand phones dealers to offer a one-stop center for Mobifon 800 services (The Star 1995b).

Competitions

Indeed the privatization policy and subsequent liberalization have turned Malaysia telecommunications industry competitive environment. To stay ahead of competition, Telekom Malaysia Berhad (TMB) and all the other private telecommunications companies that are in operation must have aggressive marketing strategies. Also they must be able to made inroads overseas to increase their market portfolio, besides making heavy investments locally.

TMB had invested RM 4.1 billion in 1994 on its network operations to further upgrade the standard of telecommunications in Malaysia. This investment is to expand the trunk, switching and local network capacity in the country. To date, SAPURA has invested close to RM 500 million on the installation of UTB payphones in the country. CELCOM has invested a total of RM 1.2 billion in 1994 to improve its operations and infrastructure facilities of its ART 900 cellular telephone services in the country (Paramjit Singh 1994). Celcom Technology (M) Sendirian Berhad, a subsidiary of CELCOM has purchased RM 11.5 million worth of equipment for its Voice Information Service (Celcom Technology 1994).

Further, it is important to have help from experts. In 1994, Telekom Malaysia Berhad has hired McKinsey & Co. to help to rethink its operations. Also, it has contracted American Telephone & Telegraph to install a revamped sales and marketing system during this year (Mark Clifford in KL 1994). BINARIANG has awarded Motorola Inc and

Siemens AG of Germany to install equipment for its GSM digital cellular network. BINARIANG said that Motorola would install a radio base station system while Siemens would install a network switching system. Further it said that the contracts represented another significant step towards BINARIANG's vision of a full-integrated telecommunications system to serve the nation's needs as Malaysia moves towards greater industrialization. The value of the contracted equipments are valued at between RM 70 million to RM 100 million (New Straits Times 1995). Also, it has formed a strategic alliance US West International Inc. by offering a 20 per cent stake in the company. In return, US West International Inc. is to develop a fully integrated local wired and wireless communications network in Malaysia, as well as setting up of local and international gateways linking to satellites (New Straits Times 1994b). In September 1994, STW awarded a RM 1.3 billion contract to Ericsson Telecommunications Sdn Bhd for the design, supply, installation and commissioning of its network

In just six months after the Mobifon 800 launch, Mobikom has made strides in value-added service. These services are ranging from Itemized Billing, Outgoing Call Barring, Automatic Alarm Call, Call waiting, Absent Subscriber Service, Immediate Call Transfer, Call Transfer On No Reply, Call Transfer on Busy to services such as 3-party Conference, Call Charge Display, Hot Billing, Voice Messaging, etc. The company recently introduced a service that will provide up-to-date information on stocks traded on the Kuala Lumpur Stock Exchange via laptops linked to mobile phones.

Research and Development

The multi players environment not only are causing the major telecommunications companies to introduce new products and services, it have steered them to be innovative and aggressive. It has encouraged them to perform research and development activities to gain a competitive edge in the market. The companies that have some form of research

and development division are Telekom Malaysia Berhad, Sapura Holdings Sendirian Berhad, and Cellular Network Communications Sendirian Berhad. The TMB Research and Development division was set up in 1988 (R & D Newsletter). Its focus was the software, operations research and networking, radio and radar, and electronics. Telekom Malaysia Berhad recognized that it is neither economical nor practical to build research expertise and facilities for all areas relevant to the business. As such, the capacity of universities and other institutions will be used. Two areas of new research effort were network simulation and local area network (LAN). With the networks' simulation, facility network behavior can be understood from the perspective of traffic flow, congestion and network interruption. LANs software will be customized to the requirements opening the door to wider applications and benefits from office automation (Telekom Malaysia Berhad 1993a).

Sapura formed a small Research and Development division in 1984. To date, it has an R&D staff of more than 40 and has introduced its own-designed innovative products such as PBX's feature telephones, SCADA equipment, personal computers and many more (Rameli Bin Musa 1990 and Sapura Telecommunication Berhad 1993/94). Its S2000 series of feature telephones designed under the most stringent standards received type approval of their first submission from Deutschen Bundespost TELEKOM, the authority on telecommunications products quality in Germany. Subsequently S2000 series received approval from the authorities of United Kingdom, United States, Canada, Germany, France, Austria, Netherlands, Japan, Indonesia, Singapore, Myanmar, Thailand, and Sri Lanka had attested to their international standard in quality and reliability. The S2000A, a single line telephone, is Malaysia's first homogeneous telephone designed and manufactured by Sapura. The S2000B is the first microcomputer controlled feature telephone while the S2000HF is the world's first voice-activated answering handsfree telephone (Sapura Telecommunication Berhad 1993/94). SAPURA has embarked on specialized research and development programs to create new designs and more

innovative and attractively packaged products. Cellular phones running on the 800MHz and 900MHz wavelengths and pagers are in their pipeline (Sapura Telecommunication Berhad 1993/94).

Celcom Transmission Sendirian Berhad, a subsidiary of CELCOM has embarked on various research projects to continuously upgrade its capabilities and services. A large part of the research project involved adapting and customizing the latest transmission technologies available today, such as Frame Relay and Asynchronous Transfer Mode (ATM). These technologies will play a vital role in delivering Celcom Transmission's Virtual Private Network and Broad band services (Celcom Transmission 1994). Through CELCOM's own research and development effort, its capacity of the Radio Base Stations has increased from the system standard of 48 channels to 120 channels. Also, CELCOM had set up Celcom Academy Sendirian Berhad in January 1993 to answer the urgent call for localized, high-caliber training in business, engineering and technical skills. Celcom Academy Sendirian Berhad main aspiration was to help increase the knowledge and augment the skills of the Malaysian work force through direct training, education, and human resource consultancy services. Under its long term plan, Celcom Academy was aspired to become a recognized telecommunications institution in 10 years and a full-fledge university within 30 years (Celcom. IRM 1994).

Financial Positions

It seems that the telecommunications industry is a profitable market to enter. Based on the performance of Telekom Malaysia Berhad and the major companies, they are making an impressive surge in turnover and good profits

Five years after being listed in Kuala Lumpur Stock Exchange, Telekom Malaysia Berhad's pre-tax profit has grown leaps and bounds. It has increase from RM 366 million in 1989 to RM 1.527 billion in 1993. This was achieved on an equally impressive surge in

turnover from RM 2.141 billion in 1989 to RM 3.391 billion in 1993, a growth of 15.1 per cent from 1992. TMB's earnings per share has been increasing since the year 1989 to 1993. It was 24.4 sen in 1989 and in 1993 it was 61.0 sen. The share price has recorded low price RM 11.90 and high price RM 22.40 in the year 1993. Table II has the detailed information. Telekom Malaysia Berhad financial position is just growing steadily. Its current paid-up capital is RM 1,985,800,000 in 1993 (Telekom Malaysia Berhad 1993b).

CELCOM's achievements in Malaysia have earned the company recognition and respect received from overseas. Telecommunications companies in other countries have invited CELCOM to join them as equity partners to develop their systems in countries like Iran, and Cambodia. This bears testimony to the level of expertise that we have achieved within an incredibly short time. International traffic on ART 900 networks shows healthy signs of growth, contributing between 20 per cent and 30 per cent of CELCOM's revenue, which is comparable to other telecommunications companies in Asean countries. CELCOM is reaping a profit of RM 108.841 million on a turnover of RM 387.229 million in 1993 (New Straits Times 1994d).

SAPURA's pre-tax profit in 1993 has increased by 62.4 per cent over the previous year to RM 37.927 million. After taxation and minority interest, profit attributable to shareholders has risen to RM 24.695 million - a 92.6% increased over the previous year. The 1992 year's profit before taxation was RM 14.160 million, representing an increased of 32% over last year's (1991) profit before taxation of RM 10.718 million. The profit was achieved on a turnover of RM 168.809 million, an increased of 81% over the previous year. After providing for taxation and minority interests, the profit attributable to the shareholders of SAPURA amounted to RM 8.206 million and the earnings per share of the SAPURA was 19.4 sen. The improved results obtained by SAPURA were due to the favorable economic conditions particularly in the telecommunications sector.

SAPURA's subsidiary, Uniphone Telecommunications Berhad (UTB) turnover was RM 186,585 in 1989/90 and increased to RM 373,533 in 1993/94 with profits of RM 14,812

and RM 53,012 respectively. The earnings per share was only RM 7.69 in 1989/90, and has increased to a surging figure of RM 42.50 in 1993/94 The payphone operations contribute about 90 per cent of UTB's profit. (Uniphone Telecommunications Berhad 1994). Its current paid-up capital is RM 69,800,000. The Table III at the appendix has the financial details of UTB. The Table III showed a growing direction of UTB too. The other subsidiary, Sapura Telecommunications Berhad (STB) turnover has been increasing since it was public listed in 1991. The turnover was RM 93,048 and has increased to RM 189,908 in 1994. Likewise, its profit before taxation was RM 10,718 in 1991 and has increased to RM 37,927 in 1994. The earnings per share was then only RM 22.50 in 1991 as compared to RM 35.80 in 1994 (Sapura Telecommunications Berhad 1993/94). The Table IV showed the financial details of STB. Its current paid-up capital in 1994 is RM 68,927,000.

The other telecommunications companies are not operational yet. As such, they do not have the financial information for any discussion. Although MOBIKOM has started its operation in mid-1994, there is no financial data too.