National Reports

TELECOM DEVELOPMENT SYMPOSIUM



ITU TELECOM ASIA 2000 Hong Kong 4-9 December





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National Reports

ТЕLЕСОМ Development Symposium



Hong Kong 4-9 December

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Bahrain



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Mobile Communications in Opportunities in Asia

Under the wise leadership of H.E. Shaikh Ali Bin Khalifa Bin Salman Al Khalifa, the Minister of Transportation and Chairman of Bahrain Telecommunications Company (BATELCO), to position Bahrain as a world-class model for communications, the sector enjoys being one of the most advanced communications infrastructures in the Middle East.

Telecommunication market development is one of the top priorities in Bahrain, with strategies which focus on addressing both the increase in competition in the local market and the requirements to transform the core network system from voice and circuit-switch based to data and packet-switch based.

From that perspective, the growth of mobile telephony continues, achieving market penetration of over 24%. The growth resulted from the PrePaid service (SimSim) which marked its first milestone in June with the celebration of its 100,000th customer.

Moreover, Bahrain's local operator, BATELCO has committed to providing further value-added features to mobile telephony and all other services.

Coupled with the company's continuing efforts to diversify its source of revenue continuing with the

acquisition of 75% of the Arabian network Information Services company, an Internet application solution provider in Bahrain, similar opportunities are being pursued locally and regionally.

Also, BATELCO announced significant reductions on Internet and datacom charges with effect from 1st July 2000. This is in line with directives from the country's leadership to review charges, making them compatible with changes in the local and international market, and to promote the use of electronic commerce. The Internet reductions will apply to installation, registration, monthly access and regular usage charges and will also include inet PrePaid cards and inet 900 services. Reductions in datacom service charges will be applied to international data communication services including Global Managed Data Services, International Private Leased Circuits and International Managed Private Lines.

Also, Bahrain will introduce the Wireless Access Protocol by the end of the year 2000, and is establishing its strategies to make the best possible benefits from the third-generation mobiles.



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ITU TELECOM ASIA 2000 – Hong Kong Telecommunication Development Symposium Country report from Bangladesh on the role of the Internet in Asian development

Introduction

Recently there have been tremendous changes in the telecommunication sector. New technologies such as the Internet and GMPCS have entered the market place necessitating the review of the policy and regulatory issues in the telecommunication sector. Liberalisation and deregulation have been introducing new players in the market for telecommunication services. New issues have arisen for different countries such as their commitments to the WTO initiatives and have extended the ambit of national interest in telecommunications. The impending impact of the Internet and e-commerce have further precipitated changes to existing frameworks of telecommunication policy, regulation and business.

Bangladesh

Some basic facts about Bangladesh

Bangladesh is a unitary and sovereign Republic known as the People's Republic of Bangladesh. It is situated in southern Asia. Bangladesh emerged as an independent country on March 26, 1971.

- Total area 147,570 sq. km;
- Population 128,100,000;
- Capital City: Dhaka;
- Official language: Bengali;
- Currency: Taka;
- GDP growth rate 1998-99: 5.2 per capita
 GDP Tk 13,655 (US\$ 282).

Historical background of BTTB

Bangladesh Telegraph and Telephone Board (BTTB) was the only monopoly telecommunication operator in Bangladesh till 1989. Looking back, the telegraph branch under the Posts and Telegraph Department was created in 1853 in the then British India and was afterwards regulated under the Telegraph act of 1885. This was then reconstructed in 1962 in the then Pakistan as Pakistan Telegraph and Telephone Department. After independence in 1971, Bangladesh Telegraph and Telephone Department was set up under the Ministry of Posts and Telecommunications (MOPT) to run the telecommunication services in Bangladesh. This was converted into a corporate body named Bangladesh Telegraph and Telephone Board (BTTB) in 1975. BTTB was again converted to a Government Board in 1979.

Present scenario of telecom services, provided by BTTB and other private operators, in Bangladesh

Up to 1989, BTTB was the only monopoly telecommunication operator in Bangladesh. Liberalisation started in 1889-1990. Presently there are a number of private telecom operators, operating different types of telecom services.

Services provided by BTTB

Present situation

BTTB is the largest telecommunication operator in Bangladesh. It operates basic telecom services,

national transmission network and overseas communication. The total telephony of BTTB is now about 500,000 and registered pending demand is 172,000.

Telephone services and data communication

BTTB presently operates 479 manual, 108 analog and 44 digital telephone exchanges, 3 tandem exchanges, 10 TAX and 3 ITX etc. In addition, BTTB also operates a PSPDN to facilitate data communication in the country. The total installed capacity of PSPDN is 216 number of x.25 ports data switching nodes have been installed in eight major cities. To increase speed of data communication, DDN has been introduced in 4 cities.

Internet service

BTTB is also one of the Internet service providers (details below).

Transmission links

Long distance transmission links are composed of MW, UHF and VHF Links. At present about 70% of BTTB's total transmission system is digital. It will be 90% by the year 2002.

At present all the local digital exchanges and RSUs are connected by optical fibre in the multi-exchange areas.

Telex services

BTTB is providing Global Telex Services to its subscribers with a main switching centre in Birmingham and a node of that switching centre in Dhaka. Presently about 1,400 subscribers are connected throughout the country.

Overseas communication

BTTB provides the International telecommunication services via four satellite earth stations. Total number of circuits is 2,302 including voice and data. These circuits are established between 25 countries with 33 carriers.

Future programme

Some 467,450 new telephone lines will be installed under eight on-going projects. In addition, three projects have been prepared to install 324,000 more new telephone lines. Optical fibre transmission links are under implementation through three projects. After completion of these projects, all the district towns of the country will be under coverage of digital transmission. A project for access to submarine cables has been prepared by BTTB and is expected to be implemented very soon.

Services provided by private telecom operators

Present situation

Two private operators are providing telecom facilities in rural areas of Bangladesh and four private operators are providing mobile telephone services. Total telephone lines provided by mobile operators are about 155,000 lines.

Future

A project has been approved to build own and operate 300,000-line telephone exchanges in the private sector. Two companies have recently been given license for installing 200,000 Japanese brand PHS (Personal Handy Phone System) and 50,000 European DECT (Digital Enhanced Cordless Telephone) respectively.

Others

Recently, V-sat service has been liberalized by the Government to promote IT infrastructure and software business. Previously it was controlled by BTTB.

Targets for installation of telephone lines in Bangladesh

Present telephone density is about 0.5 telephones per 100 lines. In the Telecommunication Policy 1998, the Government of Bangladesh has set up targets and goals for short, medium and long term, which are based on telephone line density.

- 01 telephone per 100 population is the short-term target for the year 2002.
- 04 telephones per 100 population is the medium-term target for the year 2010.
- 10 telephones per 100 population is the long-term target for the year 2025.

Considering a population growth rate of about 2%, population in the year 2002, 2010 and 2025 have been projected at 130, 150 and 200 million respectively. With these figures, the calculated target for telephone lines in the years 2002, 2010 and 2025 has been fixed at 1.3 m, 6 m and 20 million respectively. It is expected that the above targets would be achieved jointly by both public sector and private sector.

Mobile telephone system in Bangladesh

Four private telephone operators are now providing mobile telephone services throughout the country. Their total number of subscribers are approximately 155,000 which is approximately one third of the total number of fixed telephones of BTTB and two private operators. This number, seemingly low, is expected to overtake fixed telephones by the end of next year. Technology used for mobile phones are AMPs, GSM and CDMA.

Internet services

Present scenario

Internet services in Bangladesh were started in 1996. But due to increase of demand for Internet access facilities, more than 27 enterprises are providing public Internet access services using VSAT.

With VSAT, the local ISPs have been connected to international access service providers mostly in Hong Kong and Singapore. BTTB has become Internet service provider with its connectivity to Teleglobe Canada and its backbone speed is 512 kbit/s which is going to be increased to 2 mbit/s very shortly. This service is now provided in four cities. BTTB is actively considering extending this service to all 64 district headquarters of Bangladesh. At present, it provides service to around 3,500 subscribers. The total number of Internet subscribers in Bangladesh is around 100,000.

The Internet versus traditional telecommunication models

The impact of the Internet is expected to be widespread, touching all forms of economic activity, society and governmental activities. The Internet technologies and applications are not restricted to an individual manufacturing or service industry. They can be applied to agriculture, resource exploitation, manufacturing, the service industries, residential markets, and public service markets. On the other hand, traditional telecommunications are facing new environments. Currently some significant changes are taking place in the telecommunication sector throughout the world. These include:

- Increasing globalization;
- Ongoing liberalization;
- Rapid technological advancements;
- Enhanced role of telecommunications including computer communications and enlarging their applications.

Globalization of telecommunications and rapid technological developments have made it imperative for the developing countries to adopt appropriate policies for accelerating the growth of telecommunications in their respective countries.

Right now, Internet and data communication infrastructure are heavily U.S.-centric, so traffic flows are highly asymmetric. Better distributed network maps can improve the situation. The Internet is becoming cheaper and cheaper with time while traditional telecommunications are becoming cheaper with the adaptation of new technology. For example, voice over IP and voice over data are much cheaper. Also, with the development of optical fiber system and with the introduction of DWDM (Dense wave division multiplexing) technology, the telecommunication channel will become much cheaper in future. With the introduction of shared technology and advanced technology, more people can be served by the existing traditional network. So it is easier to provide basic telecom facilities to rural and under-served areas and income can be increased since traditional telecommunications are cheaper.

E-commerce – is it good business for all?

Electronic commerce provides the means to transform existing transaction functions of business, governments and individuals from the present use of physical-based media to electronic form. Electronic commerce facilitates established business to business commercial relations, sales by companies to consumers, as well as transactions between consumers. It thus potentially affects the business environment at national, regional and global levels and generates major opportunities, as well as new challenges, for new market growth, and development of new jobs, new industries and services, thus subsequently developing a new economy. The development of commerce through networks (electronic commerce) is based on the use of interactive networking capabilities provided by the development of broadband information infrastructure. The basis of these changes is the use of digital communication networks for economic transactions. But the development of information infrastructure, especially data communication and high speed data communication facilities as well as the development of business and commerce of the developing countries of the Asia-Pacific region, are poor which makes them customers, not providers, of E-commerce. Quick development of information infrastructure and business and commerce of the developing countries of the Asia-Pacific region may improve the situation.

Some Internet transactions deal with ordering material goods which have to be separately transported between contracting parties, often across regional or national jurisdictions. Tax regimes already apply to those just as they do when we shop from catalogue by mail or over the telephone.

What's left is the transaction of non-material goods and services, where the Internet not only puts the buyer and the seller in touch, but provides most of the exchange infrastructures for electronic delivery. This appears to represent a growing proportion of transactions – that's what's meant, in part, by a "knowledge economy". For this type of exchange, we do not think we see tariffs for cross-boarder transactions. Any tax regime would have to be global.

Education and training over the Internet

In Bangladesh, tele-density is only 0.5 per 100 population. Internet service is also at a very initial stage. At present, Internet service is available in only 2 or 3 cities. Computers are still expensive (a loan is available to buy computers) compared to the income of our people; the number of computer-literate people is very low, and use of computers

is very, very limited. All the district towns and backbone networks will be digital within two years. Use of the Internet will also grow. Undoubtedly, e-learning will open a new era for distance learning. But its spread will depend on the availability of cheap computers, electricity and Internet services at the grassroot level of the country which may take a long time in developing countries.

Distance education in Bangladesh

Bangladesh Open University (BOU) provides distance learning throughout the country, starting from secondary level to Masters. The BOU is an all-term system of education contributing to the uplift of the overall educational scenario in the country. Through formal and non-formal programmes, it gives educational opportunities to a large section of the population, helping in the human resource development of the country. Total manpower involved is 857 full-time employees 100% course materials (books and audio/video cassettes) are provided. Regular TV and radio programmes are broadcasted. There are many tutorial centres for each course.

Formal courses provided by BOU are as below:

| Name of school | Name of programme | Year | Total students enrolled | Male % | Female % | Passed | Course fee (Tk) | Duration (years) |
|--|--|--------------|-------------------------------|-----------|-------------|--------|--------------------|---------------------|
| Open School | Secondary School Certificate (SSC) | 1995 to 2000 | 109,442 | 56 | 44 | 11,60 | 2,000/- | 2 yrs |
| | Higher Secondary Certificate (HSC) | 1998 | 1,201 | 55 | 45 | | 3,800/- | 2 yrs |
| School of Education | Certificate in Education (C.ed) | 1998 to 1999 | 3,984 | 40 | 60 | | 2,100/- | 1.5 yrs |
| | Bachelor of Education (B.ed) | 1992 to1999 | 40,958 | 55 | 5 | 21,744 | 7,300/- | 2 yrs |
| | Master of Education (M.ed) | 1999 | 1,117 | 55 | 45 | | 5,500/- | 2 yrs |
| School of Business | Certificate in Management (CIM) | 1995 to 1999 | 1,226 | 85 | 15 | | 2,700/- | 1 yrs |
| | Graduate Diploma in Management (GDM) | 1995 to 1999 | 12,818 | 85 | 15 | 80 | 8,000/- | 2 yrs |
| | Master of Business Adminstration (MBA) | 1998 to 1999 | 410 | 90 | 10 | | 33,000/- | 2.5 yrs |
| School of Agriculture and Rural Development | Certificate in Livestock and Poultry (CLP) | 1999 to 2000 | 226 | 100 | 0 | | 2,100/- | 5 months |
| | Certificate in Pisciculture and Fish Processing (CPFP) | 1999 to 2000 | 81 | 97 | 03 | | 1,800/- | 6 months |
| | Diploma in Youth Development (DYD) | 1999 | 150 | 83 | 17 | | free | 1 yr |
| | Bachelor of Agricultural Education (B.Ag.Ed.) | 1997 to 2000 | 3,454 | 90 | 10 | | 12,900/- | 3 yrs |

| School of Social Science, Humanities and Languages | Certificate in English Language Proficiency (CELP) | 1996 to 1999 | 10,426 | 70 | 30 | 2,243 | 1,500/- | 6 months |
|---|--|--------------|-----------------------|----|----|-------|---------|-------------|
| | Certificate in Arabic Language Proficiency (CALP) | 1996 to 1999 | 1,518 | 80 | 20 | 246 | 1,500/- | 6 months |
| | Bachelor in English Language Teaching (BELT) | 1997 to 1998 | 1,776 | 70 | 30 | | 6,900/- | 2 yrs |
| | Bachelor of Arts (BA)/Bachelor of Social Science (BSS) | 2000 | Admission going on | | | | | 3 yrs |
| School of Science and Technology | Diploma in Computer Application (DCA) | 1998 to 2000 | 2,095 | 85 | 15 | | 4,400/- | 1.5 yrs |
| | Total students | | 201,682 | | | | | |

Primary education (Non-Distant Learning)

Number of primary schools

- boys: 60,654
- girls: 984
- total: 61,638

Number of teachers

- male: 181,656
- female: 68,272
- total: 249,928

Number of students

- boys: 9,194,000
- girls: 8,125,000
- total: 17,319,000

Teacher-student ratio 1:69

Total number of primary schools, attached classes of high schools and madrashas, independent Ebtedayee madrashas and kindergartens: 77,685

Number of students: 18,032,000

Number of teachers: 316,483

- Pass marks: 33%
- Operating expenses per student: Tk 554

Staff development programmes are conducted, number of primary teachers training institutes are 54, infrastructural facilities are available in most cases, traditional furniture, chalk boards, teaching materials, flip-charts are available, books are provided, language of instruction is Bengali, same syllabus followed countrywide.

Primary school net enrolment ratio (6-10 years):

– both sex: 85.2

- boys: 87.8
- girls: 82.1

Primary dropout ratio (6-10 years):

- both sex: 12.9
- boys: 11.9
- girls: 14.1

Secondary education (Non-Distant Learning)

Number of secondary schools: 13,087

Number of students both sex: 5,957,000

- boys: 3,239
- girls: 2,718

Number of teachers:

- male: 133,676
- female: 22,461
- total: 156,137
- Pass marks: 33%
- Teacher-student ratio 1:38

Staff development programmes are conducted, number of teachers training colleges are 12, infrastructural facilities are available in most cases, traditional furniture, chalk boards, teaching materials, flip-charts, etc. are available, language of instruction is Bengali.

Final SSC Examination is conducted under five Boards.

– Pass ratio: 52% (1996-97).

Safe drinking water (%)

Density (sq./km) for urban: 2,960 and for rural: 685.

Literacy rates

Literacy rate of population 5 years and older:

- both sex: 45.1
- male: 48.2
- female: 39.6 (1997)

Literacy rate of population 7 years and older:

- both sex: 48.7
- male: 54.6
- female: 42.5 (1999)

Literacy rate of population 15 years and older:

- both sex: 51.3
- male: 59.4
- female: 42.5 (1999)

Conclusion

Regarding public-private sector partnership and evaluating cross-sectoral collaboration at the national level, the Board of Investment in Bangladesh is working. In the telecom sector at present, the regulatory function is being conducted by the Ministry of Posts and Telecommunications. IT policy has been drafted which, after finalisation, will be approved by the Government. The Telecom Regulatory Commission (TRC) is under the process of formation in Bangladesh.

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Bhutan

Meeting the challenges of the new economy

Introduction

It is revealed from studies conducted by various international bodies like ITU, APT, etc. that the teledensity of many countries in the Asia-Pacific region has risen drastically within a decade. The sharp increase in teledensity has definitely resulted with high economy growth in the telecommunication sector in most of the countries of this region. The reasons for their success could be a bigger market, early start of globalization and privatization in the telecommunication market.

In the case of Bhutan, the tele-density by the year 2000 has reached little over 2% as compared to only about 0.3% in 1989. However, it cannot be fully determined that Bhutan enjoys high teledensity economy at this stage. The telecommunication business in Bhutan is still at an early stage and lot more needs to be done to milk the cash cow. At this stage, Bhutan Telecom can only be seen as future cash cow. The telecommunication sector in Bhutan is stepping towards achieving high teledensity by bringing in new reforms in this sector. Bhutan Telecom has recently been transformed into a state-owned autonomous corporation from July 01, 2000 and has been licensed to operate fixed telecommunication services including Internet services in the entire country.

Although there are many success stories about the high teledensity economy in our neighboring countries of this region, this paper will only discuss the issues related to the development challenges of the new economy in the telecommunication sector in Bhutan.

Infrastructure development

The development of the modern telecommunication infrastructure in Bhutan started quite late compared to many countries. The initial focus of the government was in the development of road networks, strengthening of government bureaucracy, establishment and strengthening of social sectors of health, education and agriculture, etc.

However, by the end of sixth Five Year Plan (1987-92), the government realized the importance of telecommunication infrastructure as a basic requirement for socio-economic development. Thus, during the seventh and eighth Five Year Plan periods, the main focus was on the development of the telecommunication sector. Within a short span of 10 years, we have managed to build a reliable national telecommunication network with international connectivity nationwide. Internet service was also launched in June 2000 and is also growing at a brisk pace. Bhutan has now a 100% digital network interconnecting all major towns, district headquarters and a few rural areas. People have now realized the importance of the information super highway.

The national telecommunication transmission network is based on terrestrial 34 Mbit/s and 8 Mbit/s Digital Microwave (PDH) systems. The main links have 1+1 redundancy. All the repeaters are solar powered with a few main stations having engine back-up. In some of the urban centers, where the requirement is not high, the services have been extended using TDMA Digital Radio Multiple Access Subscriber System (DRMASS). For domestic alternative routing, VSAT DAMA Telephony Earth Stations are also in place and this operates in the Intelsat Networks.

The exchanges are all digital SPC (stored program controlled) switches. We have some remote line units parented to exchanges. The customer access network consists of a mainly copper system. We have one WLL (wireless local loop) system in operation. For international connectivity we use an "A" Standard Earth Station at Thimphu.

Bridging the digital divide

The main driving force for the development of telecommunications was mainly attributed to the commitments made by the Government during the seventh Five Year Plan (1992-97), as it was instrumental in bridging the gap of balanced development and decentralization policy throughout the kingdom. The other major factor to realize the achievement in telecommunication development at the current stage was the source of finance made available from bilateral and multilateral agencies like JICA, UNDP and ITU.

The Master Plan for Development of Telecommunications was prepared with assistance from UNDP/ITU. The telecom sector is a capitalintensive investment and for a developing country like Bhutan the funding of a National Telecom Network would be next to impossible, but with the kind assistance from the Government of Japan, the Master Plan was implemented. In a time span of eight years the national network was realized in a phase manner.

Even with the realization of the main network, the penetration in the rural areas (where about 80% of the country's population lives) has been very low. Hence the digital divide is very obvious between urban-rural in Bhutan. Initiatives from the donor agencies and also Government nurturing are still required to enhance bridging the digital divide in Bhutan, so that there is a means of access to benefits made available in this information and technology age through an efficient telecommunication network.

Bridging urban-rural divide

Although Bhutan is a small country of about 47,000 sq km and with a population of a little over 0.6 million, our societies look very vast and separated in their own way of existence with already a trend observed in rural-urban migration. With careful study, it can be seen that this scenario could only be improved with the implementation of rural telecommunication services.

Realizing the importance of communication services in the rural areas for socio-economic development, Bhutan Telecom, with the assistance of UNDP/ITU, has recently formulated the Master Plan for rural telecommunication services, which is now in the process of implementation. Only after completing the provisioning of rural telecommunication services, it is hoped that some degree of universal access could be achieved and bring about the balance in urban-rural divide. If the distance is bridged between urban and rural through an effective telecommunication service, development activities can be effectively implemented, which could slow down the rural-urban migration and at the same time improve the socio and economic conditions of the rural population.

Affordable services

Like any other developing country, affordability by the general public to avail of any commodities or services is low due to the low income of the people and the high cost of production and provisioning of any services. The key factor which creates high tariff structure is the difficult geographical terrain to build infrastructure, scarcely distributed population and low customer base. In Bhutan, the Telecommunication business cannot be as profitable as that of the other developing and developed countries, where it is treated as the spinner machine for a high economy source. Whereas, in the context of Bhutan, it has to be viewed, at this stage, more as the foundation stepping stone towards socio-economic infrastructure development, which has a direct impact on other businesses and later towards achieving high teledensity economy.

Bhutan Telecom is the sole telecommunication service provider in the entire country and enjoys the utmost monopoly with no serious competition faced at the moment, but nevertheless, due to other external forces, its tariff structures are as competitive as any other developing country's and are designed to offer affordable prices, especially the long distance and international tariff structure. The services provided by the Bhutan Telecom are basic telephony, facsimile, pay phone, telex, HF communications in rural areas, leased lines, and Internet-related services.

Promoting convergence and global information society

Convergence of core networks, architectures and platforms such as fixed, mobile, Internet, voice over Internet, mobile Internet, etc., using Internet Protocol (IP) or Asynchronous Transfer Mode (ATM) has been a subject much talked about. Adding the intelligent network (IN) over the common platform provides added values on the service level integration. With this convergence gradually happening in some part of the globe, it is aimed to bridge the other divides in the global information society. It is now being sensed in a big way in this region too. But it would be quite optimistic for any developing nation to gear up towards promoting convergence at this stage, where almost 80 % of the people are not able to access a plain ordinary telephony service due to lack of network infrastructure, inability to afford the service provided and low percentage of literacy.

However, it is also important to note that the developing nations like ours cannot afford to distance ourselves from being part of the global information society. The development of the IT network infrastructure has to go hand in hand along with other developing activities. This is indeed a big challenge for a small country like Bhutan, before the telecommunication sector can really transform itself to provide the benefits of convergence to its entire population and integrate them into the global information society.

Brunei Darussalam



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Telecommunications in Brunei Darussalam

Current situation

- Currently, there are two service operators:
 - 1) Jabatan Telekom Brunei (JTB): wireline operator
 - 2) Datastream Technology (DST): wireless operator
- Regulated by the Regulatory Unit, Ministry of Communications
- Eventual corporatisation of Jabatan Telekom Brunei
- Issuance of operating license to DST:
 - 1) Cellular mobile service in 1995
 - 2) Public payphone service in 2000
 - 3) Internet Service Provider in 2000
 - 4) Leased Line service in 2000

Brief history of Jabatan Telekom Brunei

- Telecommunications were first introduced in the 1920s
- Established as a government department in 1952
- Major development since Independence in 1984
- One of the six departments under the Ministry of Communications

Statistics

Currently JTB has:

- about 900 staff members
- 83,000 telephone subscribers
- 16,000 Internet subscribers
- 16,000 paging subscribers
- 25% telephone penetration

New mission statement

To provide a full range of high quality infocommunication services at competitive prices to meet the social and economic aspirations of the Government and the people of Brunei Darussalam

New vision for 2005

To be a world-recognised, technologically-advanced, business-oriented corporate entity

Infrastructure development

- Key driver of telecommunications development in Brunei Darussalam
- One of the most modern infrastructures in this region
- 100% digital switching and transmission network since 1995
- Access network largely copper-based with extensive intra-junction fibre optic connections
- Direct international connection to over 38 countries over the submarine cable and satellite systems
- RAGAM 21 (Global Multimedia Access Network for the 21st century)
 - Completed in August 1999
 - Backbone to support the Government's vision for an information society in Brunei
 - Brunei's own national infocommunication infrastructure (NII)
 - Promoting the use of multimedia services in Brunei Darussalam such as e-commerce and e-government
 - SDH-based optical access and transport infrastructure

- High bandwidth, high performance network
- Located close to business customers
- Links the business communities, government organizations
- First used during 1999 SEA Games relaying live audio and video broadcasts from Games' venues to viewers in Brunei and around the region

Wide range of services

- Domestic telephony
- International telephony

- Datacommunications (FR, ATM Packet Switch) and leased circuits
- Internet: BruNet
- Paging
- Public phones (prepaid phonecards Economy Call Hallo Kad [Launching on 6 November 2000]; optical phonecards)
- Calling cards
- VoIP: Economy Call
- ADSL: e-Speed (Launching 8 November 2000)



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Cambodia

Telecommunications in Cambodia

General situation of Cambodia

Cambodia has a land area of 181,035 km² in the southern part of the Indochina peninsula, about 20 per cent of which is used for agriculture. The country's capital city is Phnom Penh. International borders are shared with Thailand and Laos PDR on the west and on the north, and the Socialist Republic of Vietnam on the east and the southeast. The country is bounded on the southeast by the Gulf of Thailand. The country has a coastline of 435 km and extensive mangrove stands, some of which are relative undisturbed.

The estimated population of the country was 11,700,000 in 1999, giving a national average population density of 59.1 persons per km². Currently, the country has an estimate rate of population growth of between 2.3 and 3.0% per annum.

Cambodia's urban population (10 to 15% of the total) is principally located in two centers: Phnom Penh and Battambang. Phnom Penh has an estimated population of one million.

For over a decade before 1990, the Cambodia economy was organized along centrally planned lines, although some economic liberalization began in 1985. This accelerated in 1989 with the restoration of private property rights, the abolition of official procurement and freeing of most prices. At about the same time, the regime gave state enterprises greater autonomy, began the process of privatization of state enterprises, under close supervision, and increased incentives for local and foreign private investment. This set the stage for the remarkable growth of the private sector. While some state enterprises were being leased or sold, those that were left were being reduced in importance by the much more rapid growth of the private sector.

On the macro-economic front, noticeable progress has been achieved over the last four years. Real GDP grew by 6.5% in 1996. According to the most recent investigations of the World Bank, the GDP per capita in Cambodia was about US\$ 290 in 1999. The per capita income is still lower at US\$ 290, making Cambodia one of the poorer countries in the region and in the world; however, per capita income has registered a significant increase from US\$ 130 in 1990 to US\$ 290 in 1999. The annual growth was estimated to be between 2% and 7% depending on the applied reform scenario.

Background of the telecommunication sector

At present, there are approximately 131,000 telephones (out of which 102,000 are mobile phones) subscribed by approximately 12,000,000 inhabitants, and more than 90% of them are located in Phnom Penh. The number of telephones per 100 inhabitants is 1.1, which comes into the lowest category in the world (it reaches only 0.24 if mobile phones are excluded). Nevertheless in these couple of years, quality and volume of the telephones in Phnom Penh have improved very much. Only satellite telecommunication facilities donated by the UN operate now connecting 21 cities. With a German government grant aid, a fiber-optic network (610 km) was constructed between Phnom Penh and the borders of Thailand and Vietnam in June 1999 as the first longdistance call and international telecommunication network.

In Cambodia many facilities of telecommunication are too old for work and do not function properly, especially cable network, since the facilities were established before the 1970s and over 30 years have passed already. To make matters worse, there is lack of knowledge and technology of telecommunications in Cambodia, since under the Pol Pot regime from 1974 to 1979, many engineers and intellectuals were lost, facilities, equipment and cables were destroyed, and even after the end of the war, repair and construction of new facilities was not possible due to lack of human resources and funds.

Such being the situation, assistance from foreign countries plays an important role in the development of telecommunication systems in Cambodia. Government grant aid, technical training, Business Cooperation Contract (BCC) and Joint Venture (JV) with foreign companies have made possible local/international call services and cellular phone business.

1) Local Call Service

Local call service is provided by MPTC, and seven private foreign companies (Camintel, Telstra, Camtel, Casacom, Camshin and Mobitel) which have BCC and JV contract with MPTC, although switching equipment was installed by means of grant aid and they all operate in Phnom Penh.

The rural call services are provided only in provincial centers and in some commercial districts. Furthermore, Camintel provides a small-scale telephone service to the 21 cities by using the communication satellite that the UN had used.

2) International Call Service

MPTC is operating an international call service with Telstra according to BCC. It has direct connections with many countries through the telecommunication satellite Intersat.

3) Long Distance Call Service

Long distance phone lines between Phnom Penh and remote rural areas are only connected manually with HF or VHF radio.

Between Phnom Penh and 21 cities, a long distance call service is provided through a satellite communications system using the facilities of the telecommunication satellite (PALAPA B4) which was donated by the UN, and using partially microwave lines.

4) Cellular Telephone Service

This service is provided by the following four JV companies:

- Analogue system: 3 companies (Camtel, Casacom, Camshin)
- Digital system: 3 companies (CamGSM, Camshin(DCS), Casacom(GSM))

And in 1996, the MPTC decided to introduce GSM digital cellular.

The above cellular telephone services are very expensive for the general public in Cambodia; the companies provide a service to the business sector only. Therefore, these services do not contribute much to the construction of public telecommunications, in other words they do not help to satisfy basic human needs, since they are run for profit making purposes only.

Internet service

MPTC entered into JV with Telstra and Canadian IDRC; these providers are called CamNet and Big Pond respectively, and Cambodia started to provide first Internet service from May 1997. The service is still at an early introduction stage of 3000 users. Both CamNet and Big Pond have not provided an Online Shopping Mall, nor does any organization provide a shopping service even if it holds a website.

Telecom problems in Cambodia

- As mentioned earlier, the reason for the terribly slow development of the PSTN, especially the fixed wire network, is because of the lack of development fund which is due to the finance structure of the government, i.e. everything has to go to the government treasury before it can come back for the necessary expenditure. And because the government has a greater need for the funds elsewhere other than telecommunications.
- In the view of an economist, the prevailing activities of the four more or less private operators and additionally of the supervising ministry MPTC to serve telecom subscribers in Cambodia must be assessed as an uneconomic constellation which necessarily will finally result in too high a price (= tariffs) for those services paid by the subscribers.
- Reorganization of the complete sector including the establishment of a regulatory body requires very urgently the intensive co-operation with and contributions of the private operators.

Without any collaboration with the partners, all efforts of MPTC regarding this matter will finally not be successful.

In view of above conclusions, the following can be stated:

As we move into a knowledge-based economy (or new economy), information, communication and technology play a very critical role in ensuring that LDCs such as Cambodia are able to address the challenges and reap the benefits the new economy has to offer.

Therefore, the medium-term strategic thrust of the telecommunication sector is to expedite the development of high-capacity and reliable backbone transmission lines with a view to maximizing the development of these networks. All operators should have access to the national backbone transmission network.



Fiji Islands

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Ministry of Information and Communications

TELECOMMUNICATION DEVELOPMENT IN FIJI – THE NEW POLICY DIRECTION FOR TELECOM-MUNICATIONS

General background

The essentiality of Telecommunications to the business sector in Fiji and to the general public at large cannot be overstated.

Whilst this fact is proven in the distribution of telecommunication services and facilities here, there are evidently demands in certain aspects of the industry that need re-consideration. Amongst these aspects are:

- growing demand for better services;
- increased teledensity;
- competition; and
- establishment of an appropriate regulatory framework.

Apart from the fact that telecommunications contribute to 4% of our national GDP, by their very nature, for developing economies like Fiji it creates opportunities to increase this contribution to the economy and have the capacity to handle and contain growth.

Government notes the increasing demand from within the broad spectrum of our society and greater dependence on telecommunications. At the same time, Government has also seen – in the proliferation of new services, systems and networks that are available today – an array of solutions that can satisfactorily address this need. In view of this, Government is convinced that the introduction of competition into the sector at this stage is timely.

With the adoption of a new industry structure in 1999, Government has embarked on an equally important related matter this year, the finalisation of the new regulatory structure for telecommunications and the establishment of the regulator, the Telecommunications Authority of the Fiji Islands. new policy directions for the sector have also been derived on the basis of these perspectives.

The fundamental goal is to be achieved from the implementation of the new policy directions for telecommunication is towards improving the operations in the Fiji domestic telecommunication markets.

Outcomes to be achieved

The restructurization of the industry in 1999 should have contributed to the realisation of tangible outcomes that provide opportunities and benefits to the market and the consumers. However, delay in this realisation and the absence of the benefits has promoted Government to set new policy directions that are articulated to achieve these tangible outcomes.

Amongst these outcomes, those that have been identified as critical include the following:

- a well developed telecommunication sector;
- a well regulated industry; and
- improved accessibility to telecommunications.

Government's new policy directions will encourage and support initiatives to modernize the telecommunication infrastructure, to enable broadband connectivity to the global infocommunication domain and to contribute to the availability of a wider choice of services.

More new value-added services will surface from infrastructure modernization. Amongst these are shopping on the Internet, video-on-demand, electronic commerce, virtual library service, distance education and tele-health. Government will institute a new regulatory framework that will bring about improvements in regulatory administration. The new structure will create an effective licensing regime and improve the management of the resources of the State, such as the radio-frequency spectrum and telephone numbering. It will also be designed to promote and support a market environment where healthy and sustainable competition can prevail.

Increased deregulation and liberalization in the industry under the new policy directions of Government are intended to attract investments to Fiji and contribute to the emergence of new business and more players in the sector. This in turn will create employment opportunities and contribute to the emergence of a new skilled workforce in Fiji.

As competition increases, it should engender efficiency in the delivery of goods and services, encourage reduction in the prices at which these are sold to the consumers, and promote improvement in their quality.

Improved accessibility will enable improved communication linkages between communities within Fiji, whether they be urban or rural. It will also enhance further communications between our communities and those on the global scene.

This outcome will bear positive impacts on business and commerce, education, health, entertainment and information. It will enable increased efficiency in the conduct of related business activities, facilitate distance education and medicine, and allow access to the latest forms of content that are accessible through the Internet.

The industry structure

Current industry structure exists in the form of an array of entities that are partially privatized, partially publicly owned, and largely monopolies.

Telecommunication services in Fiji are currently provided by three major companies, namely Telecom Fiji Limited (TEL), Vodafone Fiji Limited (VFL) and Fiji International Telecommunications Limited (FINTEL). TFL is the sole provider of local and national long-distance services to its subscribers (fixed wire or wireless) and also international services through the FINTEL network. VFL is the only mobile communications carrier that provides public cellular mobile telephone services, while FINTEL is the only carrier providing international connections for TLF and VFL. The licenses of the incumbents TFK and FINTEL do not stipulate:

- a tariff methodology to be used;
- quality-of-service target to be achieved;
- teledensity targets or coverage requirements to be reached; and
- rural telecommunication development targets to be achieved.

VFL is not separately licensed but operates as a subsidiary under the umbrella of the TFL licence. TFL also operates the only ISP access provider Internet Service (IS) in Fiji.

Currently, there is an absence of a sector-specific and structured regulatory agency and the industry is lightly regulated.

A system for handling monitoring, enforcing and reviewing of prescribed service and tariff requirements is non-existent and there is no specific mechanism for settling disputes between customers and the operators and between operators.

Highlights in the industry

Growth in the mobile phone market in Fiji has gained momentum and in six years of operation, VFL now serves over 38,000. The company has therefore, through this achievement, grown to become a major player in the industry.

In order to align ourselves with the recommendations of ITU, Government has already reserved the bands 1885-2025 MHz and 2110-2200 MHz for 3G mobile use in Fiji. All existing services that operate within these bands have been requested to relocate in order to have the bands cleared at the latest by 2003. In addition, Government has also set aside the bands 1710-1880 MHz and 1520-2670 MHz to be clear for 3G use from 2010. 3G mobile communications will introduce another new dimension in communications access into Fiji.

Strategic commitment of Government and FINTEL has resulted in investment that is made for developing the Southern Cross (Fibre-optic) Cable Network (SCCN). Fiji is one of nine landing points in this network. Both the Fiji/Hawaii and Fiji/Australia legs of the SCCN were put into service on Wednesday, 15 November 2000. On that day, Fiji entered into a new communications dimension, the dimension of the global information era. This commissioning places Fiji well in the global information village, and will generate more opportunities for further Demand for efficient, secure and affordable access to the Internet has prompted Government to invite more players in the provision of ISP Internet access service. New ISP licences will be issued in late November/early December 2000.

Government is now looking into IT development in Fiji and will develop policy guidelines that will attract investments in this field. Opportunity for more development and growth in this field has emerged through Fiji's direct linkage to the modern international optic fibre network, SCCN. By means of this network, Fiji is placed in a vantage position in the region. Commitment on the part of all involved (Government, private sector and the public) towards rendering an enabling role in such an essential development in this millennium can make Fiji become an infocommunications hub that ranks well in the Asia-Pacific region. IT and the benefits it will bring to our society will not only improve our standard of living but also foster peaceful relations, cooperation and understanding between Fiji and other nations of the world.

The integration of TFL and FINTEL in ATH

The integration of TFL and FINTEL into the holding company – Amalgamated Telecom Holdings (ATH) in 1998 has resulted in the creation of a merger of the two entities and, through a bid offer, the sale of 51% of the holding company to the FNPF.

Whilst it was expected that the integration of these entities would achieve efficiency and good synergy, it was also expected that the sale of shares in ATH would facilitate the entry of a strategic partner into the industry. The strategic partner would bring in the international expertise and capital that are needed in the development of the sector.

Issues that were to have been resolved prior to the sale of the shares in ATH and that are now amongst those that the new policy will address are:

- the review of the existing monopoly status of TFL, FINTEL and Vodafone to allow for the introduction of more competition into the market;
- the introduction of competition in the provision of all services except the provision of the network infrastructure and the provision of the standard public telephony services;

- the issue of a separate licence to Vodafone to establish, operate and maintain public mobile cellular telephone services;
- the resolving of the interconnect agreement between TFL and FINTEL;
- the instituting of an appropriate and effective regulatory framework for the restructured sector.

The New Telecommunications Policy

Government has reviewed its policy stand on telecommunications and has generated a New Telecommunications Policy (NTP). The substance of the NTP is to:

- facilitate growth in the industry;
- support sustainability in the operations of emerging medium and small businesses in the sector;
- address market distortions; and
- establish an appropriate institutional (regulatory) structure.

Government notes that whilst there is explosive growth on the global scene, and although the telecommunication infrastructure in Fiji is reasonably modern by nature, there is apparent stagnation in the sector. This to a greater degree is due to the existence of monopolies and their tendency to wield the dominance they have acquired through the licences they hold.

This situation has been accentuated through the merger of TFL and FINTEL in ATH in 1998 that has, as a result, further consolidated the management of these monopolies under one Board of Directors.

What has apparently transpired is that the process of reform and the merger have, as a consequence, also created a degree of market distortion. This distortion is evident in the existence of the following in the sector:

- the substantial degree of privatization with minimum competition;
- services bundling; and
- monopolist operations.

Evidently, it is now realized that the impact digitization would have on the market today was not anticipated when the exclusive licences were granted to TFL and FINTEL in 1990. Accelerated changes and advancements in technology have generated new types of telecommunication facilities and services that can now be feasibly provided. Government notes that if TFL and FINTEL engage in activities in these areas, the benefits to their respective businesses that they will derive will only be incremental compared to the provision of network and infrastructure and the provision of the basic public telephone services.

In view of this, Government will therefore allow competition in the provision of these new types of facilities and services. Competition will also be introduced in all other telecommunication activities except the provision of the network infrastructure and the provision of the basic public telephone services that will remain exclusive to TFL and FINTEL over a period.

Government expects that the emergence of new entrants and competition in the industry will contribute to its growth. It is critical however that necessary support is given towards sustaining the viability of the business operations of new entrants into the market. Government will therefore ensure that an environment that is conductive towards this end is created.

In addressing market distortions, Government will review the licences of TFL and FINTEL and, after consultations with the licensees, initiate the necessary procedures to make modifications to the licences in order to allow the unbundling of services under these licences to occur. This process should facilitate the granting of more licences to new players that enter into competition in the provision of services.

In order to regularize the situation under which Vodafone exists, Government will issue a separate licence to the company to establish, provide and maintain public mobile cellular telephone services. Once this is achieved, it should clear the degree of obscurity that Vodafone exists in under the TFL licence. It should also, where relevant, allow for more transparency between the company and the licensor, Government.

Finalization of a new regulatory framework

Government plans to finalize the new telecommuncation regulatory framework by mid-2001. Amongst the major related activities to be undertaken are:

- the enactment of the Telecommunications Decree (Decree);
- the establishment of the Telecommunications Authority of the Fiji Islands (TAF);
- the finalization of the Telecommunication Regulations.

A draft of the Decree has been completed. Compilation of this draft was facilitated through a consultancy engagement provided by ITU. Work on the formulation of the new set of Regulations has yet to begin. And again, this will be handled through an ITU consultancy service.

Once TAF is established, amongst the typical regulatory functions it will perform are:

- rule-making and enforcement;
- licensing;
- management of the scarce resources of the State.

They key issues that TAF will handle include:

- provision of service;
- interconnection;
- rural telecommunication development;
- pricing and tariff; and
- frequency allocation and assignment.

TAF will also be responsible for setting standards on:

- quality-of-service requirements;
- networks and facilities;
- type-approved equipment; and
- numbering schemes.

Moreover, as more competitors are allowed to operate, it will be TAF's responsibility to set competitive safeguards.

Government will ensure that the new regulatory structure has the capability and capacity to handle all regulatory matters relating to the current industry structure and the anticipated future requirements. The process leading to the finalization of the new regulatory structure and the establishment of the new regulator, the Telecommunications Authority of Fiji (TAF), is to be completed by June 2001.

Consultations

Consultations on the new policy directions of Government have been completed and the outcomes from these consultations are being compiled for presentation to Cabinet.

Initial feedback from the major players in the New Telecommunications Policy welcomes the initiative of Government to develop a competitive and efficient market. It is the general view, however, that Government needs to arrange for a smooth transition in this development and should give due consideration to the rights of the players. It is also their general view that it is inappropriate to apply certain aspects of reforms that have been implemented in developed economies that are not really relevant at this stage to the Fiji situation, since this, in their view, may not necessarily promote the interests of the consumers.

There is, however, support for the establishment of an independent regulatory body and clear rules and conditions to which the players in the market adhere.

Government had facilitated the participation of the following groups in the consultations:

- players in the industry;
- union;
- public; and
- other sectors, including education and health.

Rural telecommunications

Like most developing countries, Fiji is still grappling with extending telecommunication access to the rural and remote areas. The realization that this is an area that must not be neglected has urged Government and the private sector to assess cost-effective solutions that could be used to bridge the development divide that currently exists between our urban and rural and remote areas.

With the transfer of all international traffic into the SCCN, the use of the Intelsat slot will become available for utilization in extending access to areas that are unserved. Preliminary planning work has already begun on this.

Government's annual contribution towards rural telecommunications capital development is \$1 million.

Commitment on the part of Government and the

private sector in this area can enable the achievement of our universal service obligation within the first decade of this millennium.

Conclusion

All aspects of the sector reform that was initiated in 1998 have yet to be finalized. Amongst these is the finalization of the New Telecommunications Policy. The new directions that are prescribed in the new policy are designed to facilitate the following:

- introduction of more competition in the industry;
- growth in the industry;
- increased accessibility;
- addressing existing market distortion; and
- the establishment of an appropriate regulatory framework.

Good foresight on the part of Government and the private sector that led to enabling Fiji's direct linkage to the SCCN has positioned the country well in the Asia-Pacific region. This achievement will attract investments in Fiji and encourage and support further development and growth in the info-communication industry.

Coordinated cooperative efforts on the parts of both Government and the private sector towards developing this industry further and facilitating market growth, in this decade, should not only bring in benefits to our society at this time but also, through achievements, steer Fiji past new historical milestones.



Mr Mahmoud Y. WREIKAT Director of Technical and Licensing Telecommunications Regulatory Commission

Jordan

Regulatory Environment in Jordan

Eng. Mahmoud Y. WREIKAT

Director of Technical and Licensing

Telecommunications Regulatory Commission Jordan

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Telecommunications History

- 1921 Department of Post and Telegraph
- 1951 Ministry of Communications
- 1971 Telecommunications Corporation
- 93-95 Sector Reform
- 1995 Telecommunications Law
- 1995 Telecommunications Regulatory Commission





TRC VISION

A telecommunications environment that is competitive, advanced, regulated and available to all

TRC MISSION STATEMENT

The TRC aims to realize an effective working relationship among the state, consumers, service providers and equipment suppliers so as to facilitate the growth of high-quality, costeffective and reliable telecommunications services. It is committed to fostering competition and fair-play, and while being transparent, it strives to keep up-to-date with the latest technological developments worldwide.

TRC VALUES

Independency Transparency Objectivity Simplicity

DUTIES OF THE TRC - 1

- Promote the development of telecommunications services in Jordan;
- Promote and maintain effective competition in the telecom sector;
- Promote the interests of consumers and users in respect of the prices charged for, and the quality and variety of services;

DUTIES OF THE TRC - 2

- Promote public understanding of the telecom sector and especially the services and options available to users; and
- Encourage efficient use of the radiofrequency spectrum in accordance with international obligations.

TRC CONSISTS OF:

- Board of Directors
- Director General
- Executive Body
BOARD OF DIRECTORS

- The Minister as Chairman
- The DG as Vice-Chairman
- Five Specialized experts as Members, two of which at least should be from the public sector
- The authorities of the Board of Directors are stated in the Law

DIRECTOR GENERAL

- Appointment
 - recommendations of the Board of Directors
 - resolution of the Council Ministers
 - endorsed by a High Royal Decree
- Termination
 - recommendations of the Board of Directors
 - resolution of the Council Ministers
 - endorsed by a High Royal Decree

THE POWER OF THE TRC

- licensing
- approve pricing and tariffs
- set the returns payable to TRC
- arbitration dispute
- investigate the grounds of complaint
- approve interconnection agreements
- set QoS targets
- monitor the performance of the licensees
- Numbering Management
- Spectrum Management
- equipment Type approval

TRC FINANCIAL RESOURCES

- The "return" of licenses
- the fees charged by TRC for the services provided by it
- Fines imposed pursuant to the law
- the grant received by TRC
- the funds assigned in the general budget
- any resources approved by CoM



THE MAIN PROCEDURES OF LICENSING

- All those wishing to obtain the license will be given the opportunity to submit their proposals or applications.
- The proposal or application shall be based on providing the services to all within a reasonable period and at fair rates.
- The components of the proposal shall be based on fair, lawful competition with the licensees.

| | THE MAIN REQUIREMENTS |
|---|--|
| • | Acceptable statements illustrating the technical and administrative ability of the applicant to provide the service. |
| • | Acceptable statements illustrating the financial ability of the applicant and the funding sources of the project. |
| • | pricing bases of the proposed services, and the method of their calculation. |
| • | Types of the proposed services, the geographical coverage, and the technology used in the services. |

| LICENSES ISSUED | | | | | | |
|-----------------|-----------------|-------------|--|--|--|--|
| Services | No. of licenses | Exclusivity | | | | |
| •Fixed telephon | e 1 | 2005 | | | | |
| •GSM | 2 | 2004 | | | | |
| •Paging | 2 | none | | | | |
| •Payphone | 2 | none | | | | |
| •Data (ISP) | 20 | none | | | | |
| •Private networ | k 200 | none | | | | |
| | | | | | | |
| | | | | | | |

JTC License

- 1995 First draft (before the Law)
- 1996 redraft in accordance with the Law
- 1996 draft in Arabic
- 1997 New Draft
- 1997 First final
- 1998 Final (before privatization IM)
- 1999 Signed
- 2000 Amended (before privatization)
- 2000 Privatization (49%)

Other Licenses

- Paging
 - 1996 press release, notice, public hearing
 - 1996 tender
 - 1997 license issued
- Payphone
 - 1996 press release notice, public hearing
 - 1997 tender
 - 1997 license issued
- data
 - 1995 press release notice
 - 1996 license issued
 - 1999 public hearing
 - 1999 amended & issued license

Eng. Mahmoud Y. Wreikat ITU-T SG16 Vice Chairman

Currently he is the Director of Technical and Licensing, in the Telecom Regulatory Commission-Jordan (TRC). Worked in establishing the Telecom Regulatory Commission in Jordan, as part of the Telecom Sector Restructuring Project developing the institutional framework for the Telecommunications Regulatory Commission to promote the participation of the private sector in the Telecommunications sector in Jordan. Worked in issuing the Call for Tenders for the Paging, Public Payphones, GSM and Public Trunking and Chairman of the Technical Evaluation Committees. Also worked in issuing the PSTN License, Paging Licenses, Payphones Licenses, Trunking Licenses, GSM Licenses, Data Licenses, Spectrum Licenses and GMPCS Licenses, to the private sector. Prior to becoming involved in the restructuring of the telecommunications sector, he had a long career in the Telecom Corporation (TCC) the National Public Switching Telephone Networks (PSTN) in Jordan, and his last position was Telecom Area Director Manager. Establishing the first Telecom College 1982/85 in Jordan, he also worked as Manager of a Training Project in Telecom in conjunction with French consultants, the Supervisor & Instructor of the Engineering Training Program, Supervisor & Instructor of the University Student's Training Program and Instructor of Digital Transmission courses for the Diploma & Training Programs, in conjunction with International Telecommunications Union (ITU) consultants. Holding M.Sc., B.Sc. in Electrical Engineering from Wayne State University in USA 1981, 1982. Trained in Jordan, France, Japan, Sweden, UK and USA. Participated in different ITU activities (Conferences, seminars, and workshops) in Jordan, Singapore, Geneva, Syria, Egypt, UK, Malta, USA and Tunis.



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Mr Enota INGINTAU

Manager Ministry of Information, Communications and Transport

Kiribati

Introduction

This report is prepared as an outcome of the invitation extended to the Government of Kiribati for the ITU TELECOM ASIA 2000 Symposium.

The aim of this report is to reveal the past five years' developments in telecommunications in the Kiribati region and the future development plans for the next five years.

Kiribati

Kiribati is a state made up of 33 small islands scattered along the equator, with a total land mass of 810 sq. km in a vast economic zone covering 3.5 million sq. km of the Pacific Ocean. Kiribati is divided into three island groups, namely the Gilbert, Line and Phoenix groups. The Gilbert group consists of the 17 islands where Tarawa, the capital of Kiribati, is situated. The group combining Line and Phoenix, comprising sixteen islands, lies over 3,000 km away from the national capital, Tarawa. Kiritimati is the capital island of this group and has 360 sq. km - almost half the land area of Kiribati. It is the largest atoll in the world. It is also Kiribati's second port of entry, with its own international airport. Due to the long distance from Tarawa, the Ministry of Line and Phoenix Development has the overall management coordination in the region. Kiritimati Island is one of the world tourist centers for keen professional fishermen worldwide.

Population

As of the 1995 census, population is 77,658 with a growth rate of 1.42 between 1990-1995. According to previous statistics, Kiribati (1990 census) had a population of 72,335 with a growth rate of 2.24% between years 1985-1994. Kiribati's census for 1995-2000 will be conducted in November 2000.

Language

The two languages used in the country are I-Kiribati and English. French and Japanese have also been introduced in the Catholic secondary schools and the Fisheries Training Center (FTC, sponsored by Japan).

Climate

Temperature varies between 25 °C and 32 °C on most days. The rainy season extends from November to April within the year.

Transportation

Main transport between the islands is provided by the government and by private shipping lines. The government airline is also available but used mainly in the Gilbert group.

The international flight to Kiribati is scheduled from Tuesday and Thursday every week. Air Nauru and Air Marshall provide this service. To the Line and Phoenix group, the ALOHA airline based in Honolulu (Hawaii) provides a service and the flight schedule is on Wednesdays every week.

Vegetation

Vegetation is poor because of salt spray and most of the soil is extremely porous.

Economy

Most people live from a very simple subsistence economy where the major part of the diet is fish and coconuts. Due to salt spray and poor soil, poor vegetation is also frequent. There are other sources of income, which of course have a major influence on the economy, e.g. commercial fishing, seaweed farming, live fish exports, etc.

Telecom Services Kiribati Ltd (TSKL)

Telecom Services Kiribati Ltd is a private company owned by the Government of the Republic of Kiribati and Telstra Ltd from Australia. The 51% and 49% shares are owned by these two shareholders respectively. On 1 November 1990, the Government of Kiribati and Telstra (formerly known as OTCI – Overseas Telecommunications Commission International) entered into a Joint Venture agreement to set up TSKL to operate and develop the domestic and international network.

Function of TSKL

TSKL is committed to providing customers with a modern national and international telecommunication network for the people of Kiribati, one which is reliable, efficient, affordable and responsive to their needs.

Organizational Structure

The two shareholders, Government of Kiribati and Telstra, appoint four Directors, two from each shareholder. These four Directors are responsible for the efficient functioning of the company, and delegate their authority to the Senior Management Team (SMT). The SMT consists of Chief Executive Officer (CEO), Executive Manager Engineering (EME), Executive Manager Support Services (EMSS) and Executive Manager Finance (EMF). TSKL is divided into different divisions, namely, the Engineering Maintenance Services Division, the Operational Services division and Accounts Division. These are headed by Executive Manager Engineering, Executive Manager Services Support and Executive Manager Finance and are under the responsibility of the CEO. The EMSS role is to control all the operations and services to customers in TSKL. The Engineering Division is responsible for maintaining all technical equipment that is operational in TSKL. The EMF is responsible for dealing with customers and TSKL accounts. The CEO directly heads the other two divisions, which are the Human Resources Management and Management Xmas Island.

TSKL Telecomunication network

1 Earth station

There are two main Earth stations used for domestic and international traffic in Kiribati. One is based in Kiritimati Island for the Line and Phoenix group and another one is in Tarawa at Bairiki, used for the Gilbert group. All international outgoing and incoming traffic passes through the two Earth stations in different call routing for the Gilbert group and the Line and Phoenix group. The international dialing code for Kiribati is 686. The Bairiki Earth station uses a standard B dish antenna facing a 174° E satellite. This antenna has just recently been put back into operation after repair work completed in May 1997.

Kiritimati uses a standard dish F1 (vista) and is equipped with a 7.3 m type antenna, also facing a 174° E satellite. The power is 100% permanently supplied by solar power, with an emergency standby from a single-phase generator and the public mains supply. The upgrading is ongoing and soon will be completed (September or November 2000). There are two main systems used in the Earth station which are the Dama and IDR systems.

- (i) DAMA, Demand Assigned Multiple Access. In the past, it was used mainly for PACT Network member countries, mostly Pacific Islands. At the moment it is used for our domestic calls between the Gilbert and Line and Phoenix groups. The DAMA in Kiritimati island is used mainly for the Line and Phoenix group for the international and domestic call traffic. This is controlled in New Zealand. The DAMA consists of only 11 voice channels and one is a dedicated data 64 kbytes transmission.
- (ii) IDR Intermediate Data Rate. This is used mainly for international call traffic for the Gilbert group. This has 29 channels or circuits of which two of them are used for dedicated data transmission bearers. The bandwidth has been increased 1024 kbit/s–1544 Mbit/s. The IDR circuits are terminated and controlled in Sydney, Australia. The introduction and installation of IDR on Kiritimati will be commissioned shortly. These will counteract the customers' demands for voice and data.

2 Telephone switching section

i) Public exchange

Kiribati has two public exchanges which are situated in Tarawa at Bairiki for the Gilbert group and in Kiritimati at London for the Line and Phoenix group. The two exchanges are a compact version of ALCATEL E10 OCB-283 from France. Alcatel E10 OCB 283 is a fully digital switching system with stored program control. The exchange is programmed to operate with only 5-digit subscriber numbers.

The two exchange switches were upgraded to meet the Y2K compliance in October to November 1999. Later in May to July 2000, the main switch in Tarawa was extended to 4,000 subscribers plus a maximum of 48 PCM trunks. The new upgrading will cater to new customers on South Tarawa and a PCM trunk for remote exchanges to outer islands and mobiles systems.

The E10 OCB 283 is facilitated with the following capabilities:

- (1) Maximum of subscribers is 7,000 with extendible racks.
- (2) Detailed billing analysis of subscriber accounts.
- (3) Improved international access, charging and routing through the international gateway of Switching System.
- (4) Improved maintenance due to better support from manufactures.

ii) Exchange for Gilbert group

The main public exchange in the Gilbert group is situated on South Tarawa since that is where most of the population, including businesses, Government Administration and other services, reside. The parent exchange is situated in Bairiki, having three main subscriber connection units connected to it. One is local as a base (CSNL) since it is connected to the parent exchange with physical wires, the other two are remote subscriber connection units (CSND) connected to the parent exchange through microwave. All remote, switched subscribers have identical facilities as the subscribers connected to the host exchange.

The present number of available and used equipment numbers in each subscriber location is as follows:

| Local | Equipment | Equipment | |
|------------------|-----------|-----------|--|
| area | available | used | |
| Bairiki (CSNL) | 1270 | 1013 | |
| Betio (CSNL) | 1016 | 894 | |
| Bikenibeu (CSNL) |) 1016 | 894 | |

There are eight equipment numbers being used for data transmission, which occupy 32 subscriber numbers for each connection unit.

iii) Exchange equipment for the Line and Phoenix group

This switch is equipped with 1000 subscriber lines. It is a compact type, housed in a container, powered from the battery. The rectifier supplies from the public mains supply with an emergency standby power from a single-phase generator set.

The parent exchange is situated in London, having three PCM remote subscriber connection units, connected to it via the microwave equipment. All remote switched subscribers have identical facilities as the subscribers connected to the host exchange.

3 Complex section

The main function (work) of this section is the installation and maintenance of the following customers' equipment;

- a) Private automatic branch exchanges (PABXs).
- b) Public payphones.
- c) Fax machines.

a) PABXs

This section is manned by three staff and is responsible for the entire activities of the PABX. Should any matters arise that go beyond the capability of the officer in change, these are referred to the attention of the Manager Complex.

Types of PABX

The predominant types of PABXs on lease to the customers are the Sopho-K systems, which are now slowly phasing out, and the BCS 150s. Three other new types, NEAXICS 120, Phillips D-120 and Philips D60 as well as the Panasonic have just been introduced and put into service successfully. PC based for diagnostic tests serves all new PABXs.

The modes of these PABXs vary from small to larger ones and have different rental rates depending on the model and its capacity. On the other hand, customers are charged on the other facilities certain PABXs can offer, e.g. Call Management Accounting Call Barring, Music Source and Short Code.

b) Payphones

Originally there were six French-made "Phonotaxe BTE 80s" coin boxes which have been in service but are now slowly phasing out and being replaced by card phones. TSKL is presently introducing card phones. These card phones are card-operated only and ordered from Trendtek International, manufactured by Protel International (US). It is a centralized system where faults on all hook-up card phones can all be monitored in a centralized computer, using the "Pronet" software. The "SMART" card is used on these card phones. A total of 18 card phones are now operational. Fifteen of these are installed on South Tarawa and Betio using cable pairs. The remaining three are placed at remote sites where there is no Telecom line and power, but using VHF links for access to the PSTN and solar power for lighting and power to the payphone. This is an ongoing project and at the time of writing this report, plans for installing more payphones are under way.

(c) Fax services

TSKL also introduced fax services mainly in Tarawa and Kiritimati Island. Most of the customers are using the TSKL fax machine B150 Canon, and TSKL also undertakes connecting and servicing private fax machines. Private owners will be charged for the installation only, plus other services if required by the customers. TSKL also supply fax equipment and sell to customers with a service for a current period.

The total number of fax users is about 1000, but less than 500 are not TSKL or owned by private customers.

4 External plant section

This section is headed by the external plant manager and under the responsibility of EME.

The section is subdivided into three sections: cable maintenance; project planning and installation; and faults repair.

Responsibilities:

- Planning, construction and maintenance of both new and existing cable network.
- Maintenance of subscribers' lines.
- Installation of new DELs for new customers.
- Receiving all applications for all tele-communication services required.
- Dealing with customers' complaints

Problem:

The most common problem now being encountered was caused by the constant and easy access into joints. Maintenance staff not taking the proper procedures when closing up the joints, especially on re-openable closures, causes these. In some cases, joints have been found to be full of water when submerged in water-filled pits. To minimize these problems, the latest version of the openable closure, the encapsulated closure is now being used. The main advantage of this joint is that the conductors are encapsulated in a gel to block out water and moisture and the joint itself can be permanently locked using the sealing 'V' band clamp. Access into the joint can only be possible by cutting out the clamp with a hacksaw. Another common and more expensive problem is being caused on the above cables by other utility bodies such as the water and power companies and also by members of the public. Ducts and warning tapes are being used to mark our cables.

Upgrading Projects:

Over the past few months, external plant staff have been involved in the upgrading project. These projects were undertaken to provide relief cabling in congested areas as well as to replace poor joints with the latest version and also to control or completely stop the easy and constant access into joints.

5 Radio section

This section is responsible for installation and maintenance of all TSKL outer island telecommunication equipment (VHF and HF transceiver radios including mobile telephones, repeaters for private operators and private enterprises). It is responsible for the efficient day-to-day operation of the Communications Center which employs five telephone interconnect systems to cater for radio telephone calls to the outer islands.

Communications between Tarawa and the outer islands is on a scheduled basis operating between 07h00 and 24h00, Monday through Sunday. The schedule is designed to make communication times available to various islands roughly in proportion to their population. In the simplest type operation, the operator at the Communication Center (Bairiki) has to use a press-to-talk switch (PTT) on the console. The PTT action necessitates that the operator carefully monitors each connection for the entire duration of the call. Some near outlying outer islands from Tarawa employ a VHF link. This high-quality equipment allows direct dial service to either the main South Tarawa domestic network or international calls to most parts of the world.

Plans for upgrading

Recently, new transmitters and receivers have just been installed to replace the very old equipment. This has been done to cater for better communications between Tarawa and the outer islands. This installation utilizes the concept of Codan Automatic Radio to Telephone Interconnect.

The upgrading involves automation of dialing subscribers from the outstation to customers on South Tarawa.

The setup at the transmitting site is of Codan 8528 transceiver capable of delivering 125 watts PEP on transmit and coupled with line interface remote controller (8571) which is also supplied by Codan.

At the receiver site, the Codan 8528 transceiver is also used utilizing only the receiver portion of the radio, coupled with the 8571 for remote access.

At the Communications Center, a remote console (8570), telephone interconnect equipment (IPC 500) and line interface (8571) with two inputs (one for TX line and the other one for RX line) are being used. The system **must** have Codan Selective Call facility (SELCAL) fitted to enable automatic in-dial from the outstation. It can also be set to manual mode.

The above upgrading was implemented and commissioned in June 1997 except that the automatic mode of the IPC 500 is not fully utilized.

Further upgrading is still in the making, which will use small satellite Earth stations and microwave radio links to serve villages in all the islands.

Mobile telephone (AMPS)

The introduction of mobile phones supplied by Australian Defence Industry (ADI) in late 1998 has greatly improved the situation of those people who are on the move most of the time but need to be in touch at the same time with their subordinates. It has also eased off the problem of subscribers where there are no telecom lines available (particularly those living in remote rural areas). There are three main cells, with the Master Switching Center (MSC) located at Bairiki (cell 1) and serving the other two cells by means of microwave radio links. The total capacity of the system is 600 subscribers and can be expanded to cater for future developments.

At present, a total of 304 subscribers, including cellular card phones, are hooked up to the system.

6 Information and technology

This section was created on June 1999. The responsibility of this section is to install, maintain and program computers for Internet communications.

It also installed a new computer network in government offices and for private customers. This section is manned by three staff and is responsible for the activities of the TSKL computer network in Tarawa and Kiritimati.

The connection of the Internet was commissioned in August 1999, between Tarawa/Kiritimati and the rest of the world. The Internet Service Provider is Telstra with the speed of 128 K. During this past year a Basic Training Program was conducted on the island of Kiritimati. This training detailed the operation of PC computers and the use of Internet communications. The total number of customers using the Internet is about 369.

A special service by TSKL now provides an Internet cafe for the people who do not have Internet or PC computers in their homes. TSKL provides an email address and account for this special service to its customers. A special rate for children and adults who do their training program via the Internet is also provided. This service is open from 07h00 to 24h00 on Mondays to Fridays and 10h00-21h00 for Saturday and Sunday plus public holidays.

The use of Internet communication by the people of Kiribati is very popular.

Operation and support services

The manager who is answerable to the Executive Manager Support Services heads this section. There are four subdivisions in this section: Assisted Operator Services; Ancillary Services; Works Management Center; and Sales and Marketing.

1 Assisted Operator Services

a) Communication Centre

This subdivision deals with the inter-island HF radio connections with the capital Tarawa and Kiritimati in the Line and Phoenix group on a scheduled basis. It functions from 07h00 to 24h00 during the week, including weekends. Connections with outer islands are made by the radio telephone system. This is the only system adopted in the country nowadays. Outer islands to Line and Phoenix group call connections are passed through a domestic link via a satellite, by the DAMA system.

b) Telephone operations

This subdivision is fully responsible for the international and domestic call connections with the outside world. It has a new system of connecting calls and this is all computerized. This new system is provided by Alcatel, France, and was put into operation in July 1994.

The staff works 24 hours mainly in Taro and on a shift basis throughout the week. Telephone opera-

tors in Kiritimati Island work from 08h00 to 16h15 (7 ¼ hours only). After this hour, all operator calls are automatically switched to Tarawa operators.

2) Stores/Ancillary Services Section

This section is responsible for storage and keeping the records of stocks transport arrangements, as well as premises maintenance and security matters.

It also does the ordering of materials, equipment, and spare parts needed under the requirements of each section with the approval of the Chief Executive Officer or Senior Management Team (SMT). Most of TSKL requirements in materials and spares are ordered internationally via SMEC (Australia). The Ancillary Section also contacts direct company manufacturers who provide the equipment used by TSKL (i.e. Alcatel, ADI, etc.).

3) Works Management Center (WMC)

This is a new section in TSKL created to serve the purpose of *Customer Care*.

All customer work undertaken in TSKL, regardless of type, is controlled and processed from this section. There are seven staff including the Manager.

New services are reported and must be entered through Telstream (Computer Program) in TSKL shop fronts (for security deposit, credit check and customer signature) and each one automatically pops up in WMC for allocation of equipment numbers, recording of time and date and delivery to relevant sections to be completed. WMC must ensure that all these services are monitored and must be billed at the end of every process. Faults are reported by customers through shop fronts (Telstream) or by phone to this section. Every fault must be reported to the relevant section within 5 minutes (time and date recorded), assigned to whoever is concerned and monitored at the beginning and at the end of every process. Kiritimati Island is also controlled from this section, using phone lines, faxes and email for every fault and installation reported by customers. Mapping of the whole of Tarawa and Kiritimati is on the wall in this section to clarify every job status.

4) Sales and Marketing

This section deals with the selling and promotion of TSKL services to the public. It is their responsibility that the customers are served and are satisfied. It also deals with TSKL agreements with local and international customers regarding marketing of materials and promotion of other companies' equipment within Kiribati.

This section also collects and receipts all payments from customers and forwards them to the Accounts Section through a Data Communication (Telstream) system.

Accounts and business processes

1) Accounts section

The accounts section deals with the financial side of the company, where it monitors the revenue and expenditure. At the same time, it handles the billing of TSKL customer services. The application system used by accounts to process the financial report is the ATTACHE program. This section is subdivided into two sections, Accounts Process and Billing Process. The two sections are under the responsibility of the Manager of Accounts, and accounts clerks are answerable to their supervisor. Credit Control Officer is responsible for debtors' accounts. Processing of billing statements to customers is done on monthly basis.

For this financial year, TSKL earned a net profit of \$1,090,246.00. Net profit after tax was 0.5% less than in 1998/1999, but was 4% above the budgeted figure. Total revenue was 19% higher than the previous year and 26% higher than the forecast in the budget.

Total expenses were 25% higher last year and 31% higher than budgeted.

2) Business processes

This section deals with new ideas that can be adopted by any other section, which can be of use to the company. Its main aim is to see that everything is going well in other sections. This section is headed by the Executive Manager Finance.

Administration and management (CEO)

1) Human resources section

The section's main responsibility is the controlling of TSKL staffing. When other sections need to recruit more staff, they have to put in their recommendations to this section where, if approved by the CEO, this section informs by letter another section concerned by this recruitment.

This section also deals with the training of staff required by other sections. It has to look and search for any relevant training in any institution, either in the country or overseas.

2) TSKL Branch Kiritimati Island

Kiritimati, with 360 sq. km – almost half the land area of Kiribati – is the largest atoll in the world and serves as the administrative center for the Line and Phoenix group. It is also Kiribati's second port of entry, with its own international airport. Due to the long distance from Tarawa, the Ministry of Line and Phoenix Development handles the overall management coordination in the region. This station, like the Bairiki Telecommunication, operates independently, manned by 12 staff only, of whom: 1 Manager, 3 Technical Staff, 5 Operators, 2 Accounts and 1 Messenger.

The Manager, who is on Kiritimati, heads it. The day-to-day running of the station together with the operation of its accounts system is fully controlled by the Chief Executive Officer in Bairiki.

Conclusion

TSKL is playing an important and vital role in the development of Kiribati, providing telecommunication services to the people.

The Kiribati people are able to use the telecommunication services locally (South Tarawa), nationwide and to the rest of the world. However, the outer islands' facilities still require substantial development.

Customers are the most important assets of this company, therefore TSKL is obliged to try and meet the requirements of customers.

With the fast-growing telecommunication technology, TSKL is trying its best to keep up to date with it.

TSKL is proud that, with the services it is offering to its customers, it can bring those who are far apart closer by either actually speaking, or by exchanging messages between them.

Korea (Republic of)



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Cyber Korea 21 The informatization vision for constructing a creative, knowledge-based society

Chapter I: The establishment of Cyber Korea 21

Emergence of a knowledge-based society

The world, on the verge of entering a new millennium, is experiencing a vast transition from an industrial society into a "knowledge-driven economy," where information and knowledge are the prime sources of added value.

 In the cases of the OECD countries, knowledgebased industries account for an average of thirty-four per cent of their total GDP.

The driving force behind the knowledge-based society has been the rapid advances in information technology (IT), including the development of telecommunications and computers. A vast utilization of IT has brought fundamental changes to the social system encompassing the lifestyle and the interaction modes of governments, businesses and individuals. Levels of information and the size of the knowledge gap have greatly influenced the productivity of individuals and businesses, the economic growth of a nation, and the income disparities between advanced and developing nations.

The World Bank emphasized in its 1998 World Development Report, 'Knowledge for Development', that the core elements necessary for a nation to achieve economic development are greatly dependent on the creation, diffusion and the utilization of knowledge.

Challenges for Korea

Since the 1960s, Korea has been able to develop into an industrial nation by successfully achieving

condensed growth by means of effective imple mentation of foreign industrial technologies. As a result, Korea is now a proud member of the Organization for Economic Development and Cooperation (OECD), and has been lauded as one of the fastest-growing nations in the world. Korea's competitiveness, however, has greatly deteriorated since the mid-1990s, when Korea began to lag behind advanced nations in terms of technology and lose its price competitiveness vis-a-vis developing nations. Unfortunately, the result was the onset of the current economic crisis caused to a large degree by the vast gap in knowledge and the lack of knowledge-based management skills. Korean businesses suffered from chronically low productivity, in spite of continuous investment efforts, attributable to their weak knowledge and information base.

Therefore, the greatest challenge for Korea is to improve its national competitiveness by restoring its growth potential, and by creating an environment conducive to restoring vitality. This can be achieved through the creation of a knowledgebased economy, coupled with cost-effective and capital-efficient investment. Korea's transition to a knowledge-based economy calls for the early establishment of a vast information infrastructure through a more advanced and speedy telecommunication network. The utilization of an advanced broadband telecommunication network and information technology will not only enable the improvement of productivity and transparency in the government, businesses and individuals, but will also allow the current industries to develop into

knowledge-based industries. Unemployment pressures can be eased by fostering new industries such as electronic commerce (e-commerce) and information service providers (ISPs) that effectively absorb the downsized labor forces in society.

Although Korea achieved industrialization more recently than any other nation, by taking the initiative to achieve knowledge-based society now, Korea will be able to emerge as an advanced nation in the 21st century.

Objectives of Cyber Korea 21

- Early establishment of a vast information infrastructure

The Ministry of Information and Communication (MIC) is planning to proactively implement a more advanced broadband telecommunication network to provide Internet services, one hundred times faster than the current system, by the year 2002. It has a grand vision of making Korea one of the world's leading computer-literate countries by promoting nationwide information-based education. The Ministry is aiming to increase the number of Internet users to ten million by the year 2001. In addition, the Ministry will improve laws and regulations, as well as the environment necessary for a smooth transition to a knowledge-based society.

 Increasing productivity and transparency of all economic agents such as the government, businesses and individuals through the utilization of a more advanced broadband telecommunications network and information technology (IT).

The MIC is planning to create a digital government through the digitization of administrative services, establishment of the Intranet services among government agencies, and the provision of usercentered services.

The Ministry will be transforming the existing industries into knowledge-based ones by replacing the past transaction modes, and introducing knowledge-based management skills in various industries including agriculture, fishery, forestry, manufacturing, and services. In addition, the Ministry is fostering "new knowledge workers" through the implementation of a life-long education system and the "new knowledge workers" movement, thereby aiming to strengthen individual capabilities.

- Forming of new businesses through the utilization of a vast information infrastructure and creating new jobs by facilitating the information and communications industry.

The Ministry is encouraging a balanced development between the existing and the new industries, and is trying to extend into the unexplored frontier on the Internet. It is also planning to generate seven-hundred thousand new jobs by the year 2002 by creating a foundation in cyber space for developing the telecommunication industries, including e-commerce, information service providers (ISP), information providers (IP), software developers, and the contents industry.

Developing a knowledge-based society and Korea's new image in the Year 2002

Economy

According to the Mid- to Long-term Information and Communications Industry Market Prospect Report compiled by the Korea Information Society Development Institute (KISDI) in December 1998, the revenues produced by the information and communications industry in Korea, which recorded 90 trillion dollars earned in 1998, is expected to increase to 136 trillion dollars earned in 2002. The export prospects of the information and communications industry, which marked a growth of 30.1 billion dollars in 1998, will likely expand to 47.1 billion dollars in the year 2002. Korea's trade surplus is expected to increase to 14.7 billion dollars in 2002, from 12.6 billion dollars in 1998.

– Labor

The MIC is making efforts to improve the flexibility of the labor market by absorbing "tele-working" labor forces which amount to more than ten per cent of the total labor force.

- Administration

The Ministry is trying to decrease the work process time by up to thirty per cent by providing e-mail accounts to all public servants, introducing a full-fledged digital authorization system, and by digitizing more than eighty per cent of the circulation of government documents.

Telecommunications

The Ministry is planning to provide 1.5/2 Mbit/slevel high-speed network services to the general public at reasonable prices. In line with this, 10,400 elementary, middle, and high schools will be connected via the Internet, thereby increasing the number of users to ten million individuals.

– Information

The Ministry is striving to create the 'One PC Per Person' environment in which information concerning the lifestyle, culture and economy can be easily accessed on the Internet.

- Education and Research

The Ministry is planning to build an environment where the general public can participate in the online education program and fully utilize the various educational curricula, at any time and from any location. Research information will be exchanged on-line through interactive communications.

Business Transactions

It is expected that over seventy-five per cent of businesses will be taking advantage of e-commerce, while the size of the e-commerce market will increase to 3.8 trillion earned by the year 2002, from 55 billion earned in 1998. In addition, digitization of public procurement operations will be increased from 556 institutions in 1998 to 26,000 in 2001. – Culture

The opportunities for promoting cultural activities will be increased, since information searches will become more convenient with the digitalization of various information media and improvement in the number of digital libraries and digital museums. With the commencement of the digital television broadcasting, a four-fold increase in audio-visual quality and a greater selection of channels will be provided to the general public. Digital television broadcasting will be able to fulfill a true integration between telecommunications and broadcasting by allowing simultaneous utilization of the Internet, and the storing and editing of televised contents.

| Classification | 1998 (current) | 2002 |
|---|-------------------------------|---|
| Speed of the network service (universal service) | 33.6 kbit/s | 2 Mbit/s |
| Number of Internet users | 3 million | Over 10 million ¹⁾ |
| Number of schools connected to the Internet | 1,613 | 10,400 |
| Number of procurement EDI utilization institutions | 556 | 26,000 |
| Market volume of the electronic commerce | 55 billion earned | 3.8 trillion earned |
| Number of administrative information systems in cities, counties, and districts | 4 cities, counties, districts | 232 cities, counties, districts nation wide |
| PC penetration rate (number of PCs per 100 people) | 6.63 million (14) | 15 million (32) |
| World ranking in informatization | 22nd ²⁾ | Entered within the top 10 |

¹⁾ Based on the year 2001.

²⁾ IDC 1998 statistics.

Cyber Korea 21: Vision and objectives

- Construction of a creative knowledge-based nation
- Increasing the share of GDP of the knowledge-based industries to that of the OECD countries
- Establishing knowledge-based industries as the core element of the nation's economy
- Becoming one of the ten foremost informatization nations in the world by the year 2002, by improving the capability of creating storing, and utilizing information
- Creation of new businesses and facilitation of the information and communications industry
- New industries: 700 thousand new jobs
- Information and communications industry: 300 thousand new jobs

- Improving the productivity of the nation by utilizing the information infrastructure
- Government: Creating a digital government
- Business: Establishing a knowledge management system
- Individual: Fostering new intellectuals
- Establishing the foundation of the knowledgebased society
- Advancing and increasing the speed of the telecommunication network
- Providing computer education nationwide
- Globalizing the operating system
- Overhauling laws and regulations

Key Initiatives of Cyber Korea 21

Establishment of an information infrastructure for constructing a creative knowledge-based nation.

Advancing the telecommunication network

The MIC is trying to create an environment by the year 2002 where high-speed network services are available at any time and anywhere to the general public, through the utilization of 1.5/2 Mbit/s-level network services at reasonable prices.

- Effectively establishing the korea information infrastructure (KII)
- Facilitating competition in the telecommunications market and creating a fair competition environment
- Institutional assistance for the rapid establishment of the information infrastructure
- Upgrading the test-bed network and promoting R&D of the next-generation internet

Promoting globalization of the operating system

The MIC is trying to create an environment where knowledge and information can be exchanged at the speed of light with anyone in the world, by improving the information resources and systems to satisfy Internet-centered global standards.

- Developing and distributing an open-standard suitable for the Internet age
- Improving the Internet use environment
- Establishing databases in managing the nation's knowledge-information resources

Becoming the world's leading computer-literate society

The MIC is aiming to foster the adaptability necessary for achieving a smooth transition to a knowledge-based society, by creating an environment where all the people can receive information-based education. Its goal is to achieve a "One PC Per Person" society in which anyone can gain access to a computer, at any time and from any location.

- Providing nationwide information education
- Introducing the computer literacy certification system
- Providing one PC per person
- Building Internet plazas

Improving the environment, laws and regulations for a smooth transition to a knowledge-based society

The MIC is promoting overall innovations in society through informatization by improving the environment, laws and regulations to achieve a smooth transition to a knowledge-based society.

- Re-establishing laws and regulations to facilitate e-commerce
- Improving institutions to facilitate knowledge-based industries
- Reforming the methods and procedures in public administration
- Facilitating the chief information officer (CIO) System

Creating a safe information utilization system and a sound information culture

The MIC is planning to enforce the protection of private information and security, and to prevent the distribution of indecent information so that the general public can utilize knowledge and information safely.

- Securing safety and reliability of the information system
- Developing information security technology and fostering new industries
- Facilitating the use of the encryption system
- Establishing the digital signature certification system
- Securing the telecommunications ethics and establishing the private information security system

Chapter II: Increasing the overall national productivity by utilizing the knowledge information infrastructure

Building a small but efficient digital government

Developing information-based capabilities will serve as the driving force behind the reforms of the government and the public agencies, thereby enhancing efficiency and transparency, and improving the quality of services to the general public.

Developing information capabilities of administrative procedures to improve government productivity

- Promoting efficient re-engineering of administrative matters
- Facilitating digital authorization and the distribution of digital documents

Improving information resource management

Improving the civil administrative services

- Providing one-stop civil services
- Establishing a comprehensive administrative information system in cities, counties, and districts
- Development and distribution of KIOSKs
- Realizing open and participating administration

Promoting legislative and judicial information capabilities

- Creating a digital national assembly
- Jointly utilizing and facilitating disclosure of judicial information

Establishing environment and disaster information management system

- Setting up an environmental information management system
- Building a national security management system

Advancing the welfare administrative services

- Sharing medical information and expanding medical insurance EDI
- Promoting medical supply distribution EDI
- Establishing an integrated information system for the four major types of social insurance

Improving the productivity of existing industries by creating a knowledge management system

The MIC intends to incorporate information technology to the manufacturing, service, agriculture, fisheries and other existing industries, and to transform them into knowledge-based industries to enhance productivity and to create added value.

Assisting Informatization of Businesses

- Implementing a thorough digitization of government procurement
- Developing the information capabilities of public corporations
- Introducing CALS in each industry

– Increasing the introduction of ERP in SMEs

Developing information capabilities to strengthen Korea's industrial base

- Information capabilities in the financial sector
- Expanding the industrial information database and establishing a common network
- Creating an industrial human resource information distribution system
- Information capabilities in the distribution of agricultural and fisheries goods

Information capabilities to increase the efficiency of SOC

- Establishing a comprehensive distribution information network
- The expansion of the national geographic information system (NGIS)
- Establishing an intelligent transportation system (ITS)
- Strengthening each individual's capabilities through fostering new-intellectuals

Chapter III: Creating new jobs by using information infrastructure

Fostering new industries on the Internet-base

Facilitating electronic commerce

Fostering the IP and ISP industry

- Creating an environment where anyone who has an idea can start a business
- Supporting content development for accumulating information in cyber space

Facilitating the software industry

- Creating an environment and infrastructure in which software businesses can grow and become independent
- Strengthening the competitiveness of the software industry and diversifying channels for software distribution

Promoting IT venture companies

- Creating a base for IT venture businesses in universities and research institutes
- Facilitating investments in SMEs and venture corporations in the IT industry

Fostering cultural industries

- Strengthening marketing support and creating the foundation

Facilitating IT industries

Fostering IT research and development and related human resources

- Strengthening IT research and development
- Fostering IT human resources
- Improving IT expert certification system

Fostering IT machine industries and increasing overseas entrance

- Vitalizing the IT machines and equipment industry
- Promoting IT exports
- Early broadcasting of digital TV

Promotion strategies

The successful execution of Cyber Korea 21 will be the basis for the early realization of a knowledge-based nation powered by creativity and will provide Korea with the foundation for its survival and prosperity as a nation in the 21st Century.

In view of this, the government intends to focus its resources on carrying out the Priority Tasks for the following four years, effectively linking the processes of improving information capabilities and the development of the information industry. Priority Tasks include building information infrastructures, wiring government, business and individuals and reinforcing the basis for growth of the software and IP industries.

Toward that goal, the government, the ministries and the private sector will share responsibilities, and in the case of inter-ministerial issues, the Strategy Meeting and the Promotion Committee will act as a coordinator.

In pursuing and implementing Cyber Korea 21, the government will ensure maximum private sector participation and will work with market principles. The government will focus on building information infrastructures, providing computer-skill training and supporting the universal service principle to ensure there will be no information have-nots. All government policies will be implemented in a manner consistent with Korea's WTO obligations.

If successfully executed, a total of 1 million new jobs will be created by 2002, and a firm foundation for a knowledge-based nation will be established.

Chapter IV: Development phase in Korea Telecom market and major outcome

Development phase in Korea Telecom market

The first phase: Foundation of KT and creation of telecom market

Early 1980s to early 1990s

- In the early 1980s, in order to meet rapid increase in demand for basic telecommunication services and accommodate changes in the telecommunication sector, the Korean Government, which was the direct provider of telecommunication services then, separated its role as a service provider from its policymaking role and created Korea Telecommunications Authority (now Korea Telecom or KT) in January 1982.
 - Later on, Dacom in data communication and Korea Mobile Telecom (KMT, now SK Telecom) in mobile service commenced business in March 1982 and May 1984, respectively.
- The major emphasis of government policy during this period was on growth, both in terms of quality as well as quantity, like expansion of telephone facilities, the nation wide automation of phone services and modernization of the transmission facilities to solve the chronic shortage problem. With these efforts, the total subscribers passed the 10-million mark in 1988.

The second phase: Introduction of competition and deregulation

Early 1990s to mid 1990s

- The outstanding application of mainline service was completely filled and as a result, nearly every household gets one access line. Once the telecom industry achieved growth in quantitative terms to some extent, the improvement of qualitative aspects, including service level, has been becoming an increasingly important issue.
- By the early 1990s, the government decided to introduce competition in the telecom service sector and deregulated the industry, aiming at enhancing the industry's competitiveness and promoting user interests, by encouraging the private sector to enter into this sector.

By then, Korea started to face outside pressure to open its telecom market. The negotiations through the Uruguay Round in the early 1990s and continued WTO/GBT agreement that began in 1994 necessitated changes in the market structure.

The third phase: Full-blown competition in the market

Late 1990s (1997-Present)

In the late 1990s the government made its best effort to further competition and set up an environment conducive to fair competition in the telecom service sector. Among major measures taken were the introduction of competition in local-call service, deregulation in licensing procedure by adopting the "open system for license application" to ease entry/exit into/from telecom services. In addition, the government changed the tariff approval system, strengthened the powers of KCC.

Major outcomes

- The government has focused on enhancing the industry's competitiveness and establishing an efficient market environment by introducing more competition into the market and deregulating the industry since 1990.
- KT was founded in 1982 to become the sole telecom service provider. Now, as of the end of November 1999, the telecom service industry is in the state of full-blown competition with 36 operators in eleven facilities-

based service sectors, including two localcall service providers, 210 operators in three special service categories and 2,292 operators in the value-added service sector.

- As of November 1999, 21.25 million people subscribe to the wireline phone services and, as of November 1999, 23.44 million people use the mobile services.
 - As the information level in society is enhanced, the market demand is shifting toward data communication services from voice communication services.
 - Online communications service providers: four in 1993, 370 in 1999;
 - Online communications users: 10,000 in 1990, 220,000 in 1993, and 8.18 million in 1999;
 - Internet users: 10.86 million in 1999.
- The government's liberalization effort in the telecom market, by slowly reducing the monopolistic power of the incumbent, led to the expansion of the market, spurred technological development, enabled operators to deliver better quality and a wider variety of services at lower prices, and eventually improved the social welfare.

It also contributed to rapid growth in the national economy and made a significant contribution to prepare for the knowledge-based information society.



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Lao P.D.R.

Telecommunication Development Status in Lao P.D.R.

1 Introduction

The Lao People's Democratic Republic is a small land-locked country in South-East Asia with an area of approximately 236,800 square kilometres and is divided into 18 provinces including the capital city Vientiane. The population is about 5.1 million with a density of 20 persons per square kilometre and 10% of the population live in the capital.

2 Telecommunication background

Historically, the telecommunication sector of Lao P.D.R. has been somewhat underdeveloped with low level of investment, limited planning and modest attempt at integration. As a result, it is fragmented, inadequate to meet the demands of a growing population and cannot support an expanding economy.

In early 1990, the government of Lao P.D.R. placed high priority on developing the telecommunication infrastructure, mainly by a loan from the World Bank and grant-aid funds from the governments of Australia, France, Germany and Japan.

3 Telecommunication network

3.1 Fixed telephone network

In 1994, a fully digital network with a capacity of 17,200 lines and international gateway facilities was provided by funding from the government of Japan.

Lao Telecom Company (LTC) had planned in 1998-2001 to install 48,816 lines in the provinces and larger cities, but this has been postponed due to the difficulty in obtaining suitable finance. In early

2000, LTC had raised to 45,927 lines: 65% are in Vientiane and the teledensity had increased to 0.8 lines per 100 population.

3.2 Mobile communication network

In 1992, the country's first cellular system was a small AMPS 800 network and supplied by Enterprise of Telecommunication Lao (ETL) with a capacity of 450 subscribers. In 1994, ETL formed a joint venture with the Shinawatra Group of Thailand to install a GSM 900 network in Vientiane and supplied over 5,000 subscribers in 1997. This year, the number of subscribers increased totalling 13,887 and the GSM network is available for 8 provincial capitals including Louangprabang, Borkeo, Oudomsay, Xiengkhouang, Bolikhamxay, Khammuane, Savannakhet and Champasak. Some 80% of subscribers are in the Vientiane Municipality. Since 1998, there is one paging network, Lao Link, run by LTC with a capacity of 1500 subscribers, but this service is provided only in the Vientiane area.

3.3 Data communication and internet

There is one digital telex network provided by ETL with a capacity of 450 subscribers and 1200 facsimile machines connected to Telecom Network. Two Internet Service Providers were launched in 1999. Lao Tel is offered by LTC to 1,300 users with the speed of 512 kbit/s and planned to increase to 2 Mbit/s in 2001. Another, Lao Net, is run by the Ministry of Information and Culture in cooperation with Globecom.

3.4 Long distance network

The national backbone route is wireless, 34 Mbit/s Digital Microwave has been funded by the government of France since 1995. Furthermore, the government of Germany has funded the Rural Telecommunication Project (RUTEL) which is divided into three phases from 1994 to 2000. This project, to install 768 rural subscribers in 60 out of 120 districts nationwide, has been completed.

3.5 International telelcommunication network

All international links are via satellite, except for a 7 GHz (34 Mbps) system R2 Microwave which links Vientiane Lao P.D.R. to Nongkhai Thailand. There are three earth stations in Vientiane: F1 for traffic via Asiasat Hong Kong; F3 for traffic via Australia; another standard A for traffic via Japan and Singapore. The Lao P.D.R. government is taking part in an original initiative to develop continuous fibre optic links between six countries in the region: China, Lao, Malaysia, Singapore, Thailand and Vietnam, called the CSC project which it is planned to complete by the end of year 2000. The Lao P.D.R. government has obtained a loan from KFW on behalf of the German government to build in Lao territory, from the Lao-Vietnam border to the Lao-Thailand border, over a distance of 430 kilometres and with a capacity of 2.5 G. Work began in early 1999 and was completed in early 2000.

4 Telecommunication sector regulations

The Department of Posts and Telecommunications (DPT) under the Ministry of Communications, Transports, Posts and Construction (MCTPC) is specifically responsible for policy making for the Post and Telecommunication Sector nationwide. There is no regulatory body concerning telecommunications, other than various decrees which are mostly specific to radio communication equipment and

spectrum licensing. Currently, only private and non-government organisations are charged for the use of radio frequencies. There are about 2,000 existing licences for the low ranges of MF, HF, VHF and UHF bands. ETL, LTC and government users are not subject to licence fees.

5 The problems and difficulties requiring solutions

Currently, the Lao telecommunication market is very small and penetration is under 1%, the backbone network is wireless-based and extends only to some of the larger cities and towns in the provinces. The cost of rural telecommunications is high, due to low population density and often mountainous difficult terrain. Domestic tariffs for local and long distance calls are low but international tariffs are high due to the finance crisis in recent years. At present, there is no specific telecommunication law. In 1999, the Lao government in cooperation with the German government established the **Telecommunication Regulatory Framework Project** in order to research and issue the telecommunication laws and Telecommunication Authority for Lao P.D.R.

6 Conclusion

The Government of Lao P.D.R. has indicated its support for further development of telecommunication infrastructure – extension into the provinces and rural areas is the priority, along with the need to provide reliable and high quality international services. The transmission via optical fibre of the CSC project is expected to link Lao P.D.R. with neighbouring countries. The government recognizes the importance of private participation in the future telecommunication market, but the government intends to provide such service facilities after the year 2000.



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Maldives

Meeting the Challenges of the New Economy

Building the Infrastructure

In the last ten years, Maldives have seen considerable development in the telecommunication infrastructure and services. With virtually no telephones outside the capital, it has now developed a backbone infrastructure covering the whole country. The telephone is now accessible in all the inhabited islands.

This development in the telecommunication status has been achieved in great part by the structural changes that took place in 1988. Prior to 1988, the Government provided national telecommunication services while a foreign operator provided the international telephone and telex service under a franchise agreement. This arrangement had many problems. The main problem was the unavailability of funds to invest in order to develop the infrastructure. The small market size and the distribution of the population over a large area separated by the ocean posed great risks to any commercial investor and therefore a challenge for the government to find someone prepared to invest.

In 1998, a joint venture company was formed between the government and Cable & Wireless Plc to provide national and international telecommunication services. Forming the joint venture with an internationally reputed company was a wise decision made by the government to accelerate the development of telecommunications. The aim was to get the necessary expertise, experience and support from the foreign partner to jump-start and modernize the telecommunication operation so that the new company could be run on a commercial basis. The result has been an overwhelming success. The company started making a profit with improved telecommunication quality with basically no additional financial support from the government.

What about the universal service objectives? For a commercial company, the tendency would naturally be to focus on the most profitable parts of the business. Maldives being a country heavily dependent on tourism, it is natural to have initial development focused on the tourism sector. In the initial licence issued to the company, there was no specific obligation for the company to provide universal service. The licence was renewed in 1995, with the obligation for the company to provide access to basic telecommunication services to all inhabited islands by the year 2000.

Who funds Universal Access? Many talk about a universal service fund. Some say this has to be funded by the government as it a burden to a commercially-operated company. The burden was left with the company with the exclusivity of basic telecommunication services. Subsidizing from more profitable business areas, the company managed to develop the nation-wide infrastructure to provide basic access in every inhabited island by May 1999.

Is cross subsidization healthy for the company and the public? Cross subsidizing will not be healthy in a competitive environment, especially if USO is with the incumbent operator alone. In a monopoly environment, however, there is significant market protection to the company that would allow cross subsidization without the fear of losing profitmaking sectors of the market to competition. However, the chances of abusing the monopoly powers to impose unreasonably high tariffs will be an issue for the regulator to deal with. It is important to identify how much subsidy is required to provide the service to the rural areas. The regulator should make sure the tariffs are maintained at a reasonable level that would not allow for excessive profit to be derived in the name of USO.

In this respect, in the Maldives, the regulator's role in the tariff approval is very critical to make sure that the services offered to the public are at an affordable level while maintaining a reasonable return to the company.

Bridging the Digital Divide

Maldives tele-density is one of the highest in the Indian subcontinent. With a tele-density of less than two in 1995, Maldives now have over eight telephones per 100 people. There is, however, a lot of improvement to be made, especially in the islands outside the capital, to improve access. Even though in the capital Male, there is 1 telephone for every 4 persons (a tele-density of 25%), elsewhere this figure decreases to about 1 telephone for 40 people (tele-density of 2.25%). Residential telephone service is available in Male, and in a selected few islands where the population justifies it, there is a commercial service.

Therefore, the next step will be to go for universal service that would allow the provision of basic telecommunication services on demand and without discrimination due to the physical location in the country. Would this be realizable without private participation? As a commercial company, the telco would have significant difficulties to go on investing in what it sees to be unprofitable areas. Yet it should be noted that, unless there is a significant subscriber base that is connected to the costly infrastructure, there would not be sufficient traffic to make the sector profitable. The utilization of the public telephone booths installed in the islands shows there is potential for traffic from the islands. After all, 75% of the population is living outside the capital.

Since there is public interest in some islands to develop their own distribution network in the islands, there may be potential for private participation, at the island or atoll level, in the work of extending the infrastructure to their homes.

New technologies and efficient utilization of technologies such as GSM could help to improve the access.

Internet and the Global Information Society

The Maldives telecommunication infrastructure is primarily designed for telephone service. Hence the capacity of the backbone network composed of 155 Mbit/s SDH and 34 Mbit/s PDH links with circuit switching at 64 kbit/s. International connection is only via satellite. The charges for submarine optical fiber cable access are still unreachable for a small PSTN network. This infrastructure will not be sufficient for a wideband data network that would support a nation-wide multimedia service.

Internet service has been available in the Maldives since 1996. The service started with only one 64-kbit/s international link but has been expanded to 1 Mbit/s providing Internet access nationally to some 1000 registered customers and more than 2000 users. Access to the Internet is by dial-up connection at 33.8 kbit/s and 56 kbit/s speed. Highspeed connection to Internet is not available. Leased line connections are also offered with 64 kbit/s connection. The access charges are still considered high and will not allow for long connection time for serious usage.

In the islands where only public telephone is provided, there is no public access to the Internet. Cyber stations are now being provided to some of the islands.

For the close future, there is a definite need to improve access to the global information resources. Tele-education, tele-medicine, e-commerce and electronic governance are significantly attractive services, given the geography of the Maldives.

Promoting convergence

The Maldives need to develop the infrastructure support to both voice and multimedia services. The demand and future market situation will determine how this could be done. The use of IP-based infrastructure instead of the legacy telecommunication infrastructure may be the future network that could support multiple services with better utilization of the available bandwidth.

Conclusions

The Maldives experience shows that even in very small markets with many physical and geographical constraints, the telecommunication sector could be successful if properly managed and a suitable environment could be created for the investors. Many of the problems of slow penetration are not entirely due to the lack of funds, but also concern the efficiency of the operation, and how much access the operator has to its own funds.

Information is vital to any country. Maldives would also need to effectively participate in the Global Information Society. Before this could be done, what is required is to develop the IT capability of the people and develop an infrastructure that would support the necessary services and provide the people with affordable access to information.

Marshall Islands



Mr Anthony MULLER Director of Communications Ministry of Transportation and Communications

Mr Jorelik TIBON

Secretary of Transportation and Communications Ministry of Transportation and Communications

Marshall Islands National Telecommunications Authority (NTA)

Title 40, Chapter 1 MIRC, cited as the Marshall Islands National Telecommunications Authority Act 1990 (P.L. 1990-105) to provide for the establishment and privatization of NTA.

Objectives

- to assume responsibility for the management, operation and maintenance of domestic and international telecommunication services for the Republic;
- to perform in a manner that will best meet the social, economic and political needs of the people of the Republic for telecommunication services and to do so as efficiently and economically as practicable;
- to the extent that is reasonable and practicable, to provide telecommunication services to the widest practical number of users; and
- to encourage and enlist private sector participation in the Authority.

Operational review

The past two years can be considered "year of the Internet" for NTA and the people of the Republic. Growth of the Internet has gone beyond expectations. With an ever-increasing Internet customer base, as well as an increase in data time, this service has become NTA's most prevalent asset. The downside for NTA, though, is that e-mail services have virtually eliminated 80% to 90% of fax traffic. The 1-to-3-minute fax calls, generating \$1.70 per minute, are virtually non-existent, apparently due to this cheaper service. The Internet circuit has been expanded from 64 kbit/s, which allows for faster access and capability for more subscribers to utilize the system simultaneously.

The incoming collect call service is no longer offered by NTA, due to collection difficulty. In an effort to recover some loss of traffic from this service, NTA has revised and enhanced prepaid calling cards. In addition, a Marketing Supervisor position was created and the Marketing Department established. Its primary function is to promote NTA services through advertising, awareness campaigns and personal contacts. A full-time in-house legal counsel was hired to rectify the collection problem.

An inventory of computer systems and other electronic equipment that may have affected NTA's critical operations, due to the Y2K phenomena, was completed in the first quarter of 1998. This assessment was the first phase and the remediation phase commenced before the new millennium. The second phase consisted of bid specification drawn up to purchase, from outside vendors, hardware and software for the financial reporting system to be Y2K compliant. On 30 August 1998, the Board of Directors approved a proposal to upgrade switches on Majuro and Ebeye (the two urban centres) to be in compliance, and on 30 September 1998 a contract was signed. Testing and validation of the systems were completed after the hardware and software were installed. The total expenditures for this project amounted to \$664,550.00.

The short-range plans for the construction and commissioning of a new satellite earth station on Majuro were completed in the second quarter of this year, with the completion of a new mobile and fixed cellular telephone system on Ebeye and Guegeegue later this year; further development is foreseen of telecommunication services in some of the remote outer islands through newly established mobile telephone systems and mini-satellite.

Myanmar



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Meeting the Challenges of the New Economy

Background

The Union of Myanmar covers an area of 678,000 sq. km. The country is administratively composed of seven states and seven divisions. At present, there are 49 million inhabitants in Myanmar out of which 80% are in rural areas. Migration of rural to urban is somewhat significant.

In accordance with existing telecommunication regulations, all the telecommunication services are operated and provided by the government, assigning Myanmar Posts and Telecommunications (MPT) as a government enterprise for the operation and provision of domestic and international telecommunication services.

MPT is aware that telecommunications are the backbone of the economy. MPT, by making use of its available resources, made possible the implementation of new telecommunication equipment (transmission, switching, etc.), extending out to reachable rural areas. Due to the topography of the country, microwave radio relay systems were introduced for national long-distance communication. The systems are now extended to far-flung rural areas wherever feasible. Manual telephone switchboards are still in service in some rural areas and in small towns. MPT is trying its best to replace manual switchboards with more reliable digital switching systems. Digitalization of national transmission is 70% and that of telephone switching is 80%.

Telephone density of the country by the end of 1990 was 0.17% and the present telephone density is 0.5. Though the growth is not significant, it should be noted that MPT had tried its best to boost up the number of telephones in Myanmar to reach the people living in rural areas.

Telecommunication development activities

Amongst its significant development activities, in 1978, MPT launched the first telecommunication development project promoting and improving the telecommunication services on offer. The project comprises the installation of local crossbar automatic exchanges (3 in Yangon and 12 in provincial towns including Mandalay, the second capital city of Myanmar), the installation of 5 systems of 6 GHz 960 channel baseband analogue microwave systems, the installation of 2 national transit crossbar exchanges (one in Yangon and another in Mandalay), the installation of a standard B satellite earth station with one SPC international gateway switch and implementation of one SPC telex switch in Yangon.

The first telecommunication development project had brought in Subscriber Trunk Dialling (STD) facilities for the first time to eight towns in Myanmar, including Yangon and Mandalay. The standard B satellite earth station, with a capacity of 60 SPC/IDR circuits, had direct connections to six countries at that time. When the first project was completed, there were 34,400 automatic telephone lines nationwide.

Upon completion of the first project, MPT continued the progress by implementing the Second Telecommunication Development project in 1985 and completing it in 1987. The second project enhanced the first by the installation of 13 new exchanges three in Yangon and 10 in provincial towns. Unlike the first project, the exchanges installed during the second project were digital electronic exchanges. During this period, two new microwave systems were also implemented. The second project raised the total number of telephone exchanges installed to 243 and total number of telephones to 73,203. Local automatic exchanges, national transit exchanges and microwave routes together with UHF/VHF links, implemented during the first and second telecommunication development projects, provided Subscriber Trunk Dialling service to 20 towns including Yangon and Mandalay. These two development projects contributed significant telecommunication services for the promotion and strengthening of the socio-economic situation of the country. The funding of the two projects came from credit through the World Bank.

The project for the implementation of eight digital automatic exchanges in eight provincial towns was initiated in 1987 with the cooperation, in the form of a grant, of the Japanese Government. The project was suspended in 1988 after the installation of the switches in four towns without the outside plant network. MPT, using available materials, was able to construct the outside plant and commissioned the four exchanges. The implementation of the remaining four exchanges and outside plant cable networks is still pending.

The project for the establishment of a standard A satellite earth station and a new international gateway switch was also initiated in 1987 with the cooperation of the OECF Japanese Yen Loan. The project was also suspended in 1988 after KDD had completed the survey works just before September 1988. This made MPT continue to use the standard B earth station till February 1994, with 60 telephone channels connected to seven countries. MPT launched a standard A satellite earth station with a new international gateway switch in March 1994 and the system at present is operating with 904 digital grade voice circuits destined to 16 overseas gateways (13 countries). The introduction of a standard A earth station and new international gateway switch enabled MPT to provide easy access to International Direct Dialling Service. The system can now be expanded to up to 1020 international trunks.

The project for the implementation of 10 digital exchanges was launched in 1991, with five host exchanges and five remote exchanges. This was the very first step by Myanmar to carry out such a project after IDA stopped the credit.

Action for the future

MPT, as a sole provider of telecommunication services in Myanmar, is making continuous efforts to develop telecommunication infrastructure in Myanmar. MPT is aware of the fact that communications provide an essential tool for the administration, economic, social and cultural development of people and also encourages man's growing expectation of progress, to a certain extent. MPT also noticed that development in the telecommunication sector truly supports growth in economy, the boosting up of productivity, acceleration of industrial activities, improvement in agriculture outputs, greater transportation efficiency and social equity.

With these facts in mind and taking guidance from the leaders of the country, MPT has continued planning for more additions to the telecommunication networks as well as upgrading the services offered. In recent years, the demand for telecommunication services has significantly increased due to the existing economic situation based on a market-oriented economy.

Myanmar introduced cellular mobile telephones (D. Amps) in 1994 with a low initial capacity of lines. The system is now operating with a limited supply of spare parts. CDMA fixed and mobile system was implemented in 1996 and the system also is being operated with a limited supply of spare parts. GSM system, contracted for 135,000 subscriber terminals, is to be completed soon.

Internet for e-mail service was introduced very recently. It should be stressed that provision of IP is still in its infancy. But it is anticipated that IP service can be expanded in the near future.

MPT is increasing the number of telephone lines by 17% yearly on a successive basis. All international communications rely chiefly on satellite communication using Intelsat 60°E Indian Ocean region. Myanmar is on route to participate in the SEA-ME-WE3 submarine cable project.

MPT, though a government entity, operates its services on a commercial basis, maintaining a commercial accounting system. The operating ratio has been kept at a healthy figure. Work in recent years has been successfully carried out, not only with governmental budgets and loans, but also with contribution funds raised by communities on a selfsupporting basis.

Conclusion

It is worth emphasizing that, as an organization in a developing country, MPT has managed to survive, to some extent, the changes in the field of telecommunications. MPT has obligations to the country and to the region as well to keep pace with the growing and improving field of telecommunications; and will continue to strive for its goal to provide better and advanced services in the future.

Nepal



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Meeting the challenges of the new economy

The infrastructure

At the national level, His Majesty's Government (HMG) of Nepal has already recognized IT and telecommunication development as one of the prime movers of overall economic growth of the country. A more than seven-fold increase in telephone lines, from 35,000 lines in 1990 to 255,000 working lines by mid 2000, could be considered as satisfactory. Tele-density has crossed one and is expected to reach two within the next two years. However, with mobile telephone density of 0.03, with less than 30,000 Internet users in a population of 23 million and with 60% of rural areas without any kind of telecommunication service, it is important that Nepal should attempt faster growth in telecommunication infrastructure. In previous projects related with expansing telecommunication services in the country, financial assistance was mostly managed from the World Bank and other donor countries. It is worthwhile to mention here that in all those past projects, including the ongoing Sixth Telecom Project, local manpower was mostly involved in planning and project implementation, including all installation and construction activities, with minimum foreign experts and no foreign contractors. This enabled Nepal Telecommunications Authority (NTA) to execute projects with minimum cost without engaging expensive foreign contractors and without bringing in "overhead cost dominated" turnkey projects. This could be one of the rare examples in Third World countries.

Although the responsibility for operating all telecommunication services rests with a governmentowned organization, Nepal Telecommunications Authority (NTA), the sector has already been liberalized. There are a number of VSAT operators, ISPs and Radio Paging companies operating in the private sector. It is expected that there will be one more private mobile operator and one for basic services based on Wireless Local Loop by the end of next year. Hence, so far as the telecommunication sector is concerned, in a way, Nepal has already introduced a fully liberalized competitive environment as expected by international agencies like WTO and the World Bank. In this new liberalized environment, with probable competition in all telecom services – including international and domestic long distance services, there are certain issues which have to be urgently addressed, e.g. cross subsidy between the local telephone tariff and long distance tariff, cross subsidy between rural services and urban services, possibility of unbundling of various services, compulsion of interconnection arrangement between competing rival operators, ever-increasing competition from uncontrollable and unauthorized foreign telecommunication service providers, inadequate and weak regulatory apparatus, etc. Continued confusion on these issues among policy-makers and decisionmakers is likely to hinder fast growth in the sector.

Urban-rural divide

If one considers problems associated with the urban-rural divide in developing countries. Nepal is most probably facing the biggest challenge. Almost half of Nepal's territory is covered by the highest mountain range in the world. Hills and mountains cover almost two-thirds of the total area. Hence, accessibility to all remote villages in high mountains by terrestrial systems is virtually impossible. This technical problem is further aggravated by the ever-increasing demand from the urban population for faster expansion of the telecom network in city areas, resulting in higher priority given to profitmaking urban services. As NTA, the incumbent operator, is considered as a commercially-oriented business corporation, there is a strong school of thought prevailing among senior managers and executives that NTA should focus only on profit-

making services and give less emphasis on rural services. Obviously, this has created more confusion to policy-makers regarding the problem of the urban-rural divide. As subsidy is considered to be taboo in the new liberalized environment, there is a feeling that expansion in rural services might be detrimental to the service provider in the long run, as per capita income in rural areas is considerably low compared to urban population. But the government is convinced that telecommunication services in remote villages will have a catalytic effect in the overall development of those areas. For instance, there are villages from where one has to walk for four or five days to reach the nearest motorable road or an airport. One can imagine the effect of a telephone line for a health officer or, for that matter, any government employee stationed in such a village.

Thus, to avoid a possible increase in the gap between urban and rural services, the government has decided to give more responsibility to the incumbent operator NTA for investment in rural services. Accordingly, NTA has already made an ambitious plan to take basic telephone facilities to all 4,000 villages in the country within next two years. The plan includes VSAT as well as WLL systems, to be installed to cover all villages. But again, the debate is still going on among NTA employees regarding the economic viability of taking responsibility for those vast rural networks in the upcoming competitive environment where the private sector will be busy "cream-skimming" the lucrative urban services.

There is growing doubt among policy-makers regarding the possibility of an increased level of negligence in rural areas in the fully liberalized environment. The government is trying to find out ways and means to minimize possible negative impact in the expansion of rural services. Experiences and analysis on this aspect from other Member Countries will be of great help.

Affordability and tariffs

With very low per capita income, the biggest challenge for countries like Nepal is to find solutions to give affordable services in far-flung corners of the countries. Obviously, one of the most hotly debated issues in the newly acquired competitive environment in the telecommunication sector is that of tariff. With one of the lowest tariff rates for local and domestic long distance calls among similar economies of the world, NTA is still one of the most successful public enterprises, placed as the highest income tax payer in the country. One main reason for the good financial health of NTA is higher tariffs for international calls. As the government has already opened up the sector for competition, common sense dictates that international tariffs must be brought down substantially and local and domestic long distance prices increased to make them cost based. In fact, NTA has already proposed this tariff rebalancing, which has yet to be approved by the government. But the irony is that customers as well as law makers and policy-makers are expecting a lowering of tariffs in all fronts - local, domestic and international - once the competition takes place. Now the government is in a dilemma: how to explain to the customers the need for higher priced telephone calls for the sake of competition and liberalization. The general public refuses to believe that competition has compelled NTA to increase local and domestic tariffs; instead they opine that NTA should increase its efficiency and productivity to compensate the lower income from international calls.

Convergence

Notwithstanding the need for top priority to increase tele-density and to increase coverage to rural areas, Nepal cannot ignore the ever-growing demands for a variety of new services and latest technologies in urban areas from the business and industrial community. The country needs to adjust to the rapidly changing environment in the global scenario of convergence of technologies and services by bringing in the latest and world-class telecommunication services. What is lacking in order to move forward in this direction in Nepal is not only the technical expertise but also a sense of mature direction and appropriate vision on the part of policy-makers and decision-makers. This weakness could be solved with the help of organizations like ITU and APT.



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The Role of Internet in Asian Development

The Internet versus traditional telecommunication models

Omantel believes that Internet telephony is playing a key role in the development of new combined media services that will allow consumers to acquire voice, video, messaging, data services and entertainment through a single interface. The challenges posed by the Internet technology, such as VOIP/telephony, are more of an opportunity than a threat. As for voice offering, both technologies – circuit switch and Internet – can be utilized to optimize profits. Internet telephony has forced the traditional telephony tariffs to drop considerably to the point that IP telephony, in some cases, does not give any cost advantage over traditional telephony.

Omantel was the first operator in the region to introduce PC-phone Internet telephony launched in 1999. Phone-phone Internet telephony is expected to be launched in the fourth quarter of 2000. Omantel will continue following the leads of market innovations to adapt those technologies and services that would best suit its business model.

E-commerce: Is it good business for all?

E-commerce has emerged as one of the bigget challenges of modern times. We believe that e-commerce for developing countries will be considered as both an opportunity and a barrier towards new global markets.

– Benefits/Opportunities

E-commerce will improve competitiveness and provide more options and choices for developing countries. It can cultivate new local industries, flexibility and ease of doing business – as for, example, banking, autoregistration, insurance, etc., will help develop local markets in a competitive and cost-effective manner.

– Threat

The threats presented by e-commerce are inadequate infrastructure, high tariffs, low penetration, as well as the dominance of e-commerce by western countries.

The standards set by the West, especially USA, may impose restrictions on the developed countries to take advantage of the technological advances in payment, security and other related components of e-commerce such as encryption technology.

– Summary

The competitiveness of the global economic environment will result in changes in the local economic structure. This will open up new opportunities for companies to propel themselves onto the new global market.

The developed or western countries must extend cooperation and support to developing countries in nurturing e-commerce by working at government level in order to set priorities and mandates for e-commerce with realistic deadlines.

Education and training over the Internet

Cyber or distance learning is indeed a very beneficial product of Internet technology. The problem, however, is still that of inadequate infrastructure, high tariffs and low penetration of Internet service.

Although an excellent concept, it will take a while for an average person in the developing countries to take advantage of the technology for the reasons mentioned above.

Oman

The involvement, no doubt, should be at all levels of the educational institutions and authorities to promote distance learning. Distance learning is at its infancy in Oman. A very small number of people subscribe to companies such as ZDNET University.



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Country report of the Philippines

Introduction

The Philippines, being a country of more than 7,000 islands and with difficult topography, is faced with a challenge to provide its people access to telecommunication facilities.

Philippines

Innovative measures have to be introduced to increase the availability of telecommunication facilities and services.

Fixed telephone lines

The Philippine telecommunication sector has experienced dramatic growth in the past five years. After the government issued Executive Order 109 for the improvement of the local exchange service in 1993, several projects were undertaken simultaneously by different telecommunication companies, starting in 1995. With a meager 1,410 million installed lines in 1995, the National Telecommunications Commission (NTC) reported that, by yearend 1999, there were roughly 6.8 million telephone lines in the country.

Interconnection

The tremendous increase in the number of lines resulted, however, in some interconnection problems among the telecommunication companies. The policy, rules and regulations on interconnection that were issued in 1993 proved to be inadequate to effect interconnection.

Among problems cited were that the 90 days given for mutual agreement between the interconnecting parties was too long before the regulatory body can intervene. Commercial aspects of the interconnection agreement as well as the technical aspects of the agreement were used by interconnecting parties as reasons to make the interconnection agreement difficult. Several initiatives were undertaken, both by the legislative and executive branch of government, to resolve the interconnection problems. Hearings were conducted to identify the gaps in the existing policy and regulations on interconnection. A new set of interconnection guidelines was issued by the NTC and this took effect mid-August of this year. The new set of interconnection guidelines provided new rules that were not covered by the previous ones, as well as clarified some provisions of the "old" interconnection rules and regulations.

During the implementation of Executive Order 109, many areas that were previously indicated by the implementing telecommunication company were not served for various reasons. Some of these reasons are; (1) the Asian financial crisis; (2) lack of demand in the area; (3) high cost of extending the service to remote areas; and (4) subsidies to local exchange operations are not yet feasible since the international settlement rate is going down.

These reasons, together with other reasons cited by telecommunication companies, were noted by the government. An evaluation of the feasibility of the scheme previously adopted is being made, and a new policy that would enhance accessibility of telecommunication facilities in remote areas of the country is due to be issued.

Mobile telephone service

Another important milestone in the implementation of development programs in telecommunications is the unprecedented increase in the number of cellular subscribers. From the 493,862 cellular subscribers in 1995, this number has increased to 2.85 million representing a 570% increase in yearend 1999. The number of subscribers even increased to a remarkable 4.3 million as of May 2000. The increase in the number of cellular subscribers was caused primarily by "marketing gimmicks" or promotional offers by cellular telephone companies. The proliferation of mobile terminal vendors and the introduction of prepaid billing made it easy for the people to become cellular subscribers. The introduction of short messaging service through the GSM technology also contributed to the sudden increase in subscriptions.

Privatization

With many areas still unable to access a local exchange service, the government has to provide facilities to these areas. Telecommunications Office (TELOF), a sectoral agency of the Department of Transportation and Communications (DOTC), continues to operate public call offices (PCOs) and

limited local exchanges in areas where the private sector has limited or no telecommunication facilities.

To implement the policy of the government on privatization as stated in the Telecommunication Policy Act (RA 7925), government-installed facilities were scheduled to be privatized. Some of these facilities were indeed privatized. However, the privatization schemes have to be re-evaluated after certain biddings have resulted in failured ventures.

Conclusion

The development of the telecommunication sector in the Philippines has resulted in certain problems. These problems, however, can be considered as "growing pains". What matters most is that the telecommunication sector's performance in the past five years marked a tremendous increase in the availability and improvement in the quality of telecommunication facilities and services in the country.


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Saudi Arabia

Mobile Communications – Saudi Arabia

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- 6 Introduction of WAP services, GPRS and 3G technology
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Appendices

- Appendix 1 Network features
- Appendix 2 Supplementary services
- Appendix 3 Services provided on a trial basis
- Appendix 4 New services planned
- Appendix 5 Map showing service coverage
- Appendix 6 Glossary

1 Mobile services prior to GSM implementation

Mobile services were first provided in Saudi Arabia in 1979. The system, installed by Harris, was analog and provided limited subscriber capacity and geographic coverage. It was replaced in 1983 with an Automatic Mobile Telephone System (AMTS) which was installed by Ericsson and Philips and had a capacity of 19,000.

2 GSM

In 1995, the Ministry of Post Telegraph and Telephone (MOPTT) started the implementation of a GSM network. Service was launched in January 1996. The system had an initial capacity of 200,000 subscribers and initial coverage was limited to the main cities of Riyadh, Jeddah and Dammam. Over the past four years, the system has experienced continued expansion and the installed capacity is expected to be 2 million by the end of year 2000, a ten-fold increase in capacity since the initial installation. Following are some highlights of the GSM network:

- Network features. (See Appendix 1)
- Supplementary services. (See Appendix 2)
- Services provided on a trial basis. (See Appendix 3)
- New services planned. (See Appendix 4)
- Service coverage. (See Appendix 5)

Currently, the GSM network provides coverage to all the main cities, major towns and villages and main highways. Coverage includes about 70% of the populated area. Appendix 5 shows the general layout of the network.

At present, GSM has not been used in any significant way to provide access in rural communities. Subscriber radio systems (SRS) and wireless local loop (WLL) are more commonly used. With changes in tariffs, it is likely that GSM could become competitive with subscriber radio (SRS) and wireless local loop (WLL) systems.

3 Challenges faced in introducing GSM

Many challenges were faced in introducing GSM in Saudi Arabia. Among them were the following:

Billing

The initial billing system which was installed lacked the functionality to support a multi-rate billing table where rates were a function of community of interest and distance, as in the public network. To deal with this problem, a flat tariff had been introduced where the per minute charge was the same for all calls, local or national. The highest national per minute charge was used. Needless to say, this caused some customer resistance.

Land acquisition

Saudi Telecom was under the Ministry of Post Telephone and Telegraph (MOPTT) when the GSM program was implemented. As a government agency, it was more economical to use government-owned land for cell sites rather than purchasing land from private individuals. Where government-owned land was required, arrangements had to be made to transfer ownership from the relevant ministry to MOPTT within an acceptable time limit.

Balancing of the network and network optimization

The installation of the GSM network was concurrent with the Telephone Expansion Project No. 6 (TEP6). This project was a major undertaking and involved both a re-engineering and expansion of the entire fixed network. The existing analog long distance network was replaced with a fiber network, PCM junction facilities were replaced with fiber and the five-level switching hierarchy replaced with a three-level hierarchy.

The GSM network depended on the implementation of TEP6 for the following connectivity:

- MSC to MSC
- SN to MSC

The coordination of the GSM requirements with the TEP6 implementation schedule was an extremely difficult and complex task.

Frequency availability

The initial GSM system operated in the 900 MHz band had an allocated bandwidth of 5 MHz. There were other users of the 900 MHz band and as implementation of the GSM project proceeded, the availability of more spectrum became a major issue. Over the course of time, the release of additional spectrum for the 900 and 1800 band was granted.

4 Comparison of mobile and fixed line installed capacities

In 1999, the installed capacity of the mobile network was 30% of the fixed network. Based on current projections, this percentage is expected to be 79.0% in 2003. At present, network limitation prevents mobile-usage charges from being any less than landline charges. With the advent of competition, it is expected that such restrictions will no longer exist. Such a move could lead to lower mobile-usage charges and accelerate growth in the number of mobile customers compared to customers in the fixed line network. As customers migrate from the fixed to the mobile network, it is likely that the number of mobile customers would exceed the fixed line customers within five years. This is a worldwide trend.

The implication for policy makers is that the investment in the fixed line network may have to be supported by a customer base which could show declining growth. Since the major plant investment in the fixed network is for local service, which generally is subsidized, the question has to be asked as to where the revenues to subsidize local service will come from. It is reasonable to assume that there will be pressures for increases in local rates and universal access. This situation could be made worse by rate rebalancing.

| Year | Installed capacity fixed lines (million) | Installed capacity mobile (million) | Mobile/fixed lines (%) |
|-----------------|--|-------------------------------------|---------------------------|
| 1999 | 3.8 | 1.1 | 30.0 |
| 2000 | 4.7 | 2.1 | 42.3 |
| 2003 (forecast) | 6.3 | 5.0 | 79.0 |

5 Growth in the customer base for mobile services and societal change

The demographics of Saudi Arabia point to greater usage of mobile services in the future, with the population projected to grow to 24 million by 2003. By this time, more than 50% will be under 20 years of age. As this segment of the population becomes teenagers and young adults, they can be expected to be technology conscious and more likely to subscribe to mobile services compared to the present generation of adults. This presents both opportunities and threats for Saudi Telecom. Opportunities, in that the market will grow, both in the customer base and in the range of services. Threats, in that the failure to develop proper long-term strategies could lead to a loss in market share as customers move to other service providers who better meet their needs.

As we look forward, we can therefore assume that the usage of mobile communications (non-business usage) in Saudi Arabia will grow increase a growth strongly driven by demographic changes. This new and growing customer class will more likely be communicating with friends or accessing various services and applications, not from the fixed network, but via mobile access. What effect will this transition have on society? Saudi Arabia, unlike Europe and North America, is a more traditional society with great emphasis on the closeness within the family. Are the changes in the way people communicate – that, is greater use of mobile communications – likely to impact this relationship? If so, how?

6 Introduction of WAP services, GPRS and 3G technology

Mobile communications in North America, Europe and Asia are undergoing rapid changes with the introduction of new services such as Wireless Access Protocol (WAP) based services. Changes are also being driven by the need for higher transmission speeds and greater bandwidths for services such as high-speed data, Internet and multi-media services. Here in Saudi Arabia, General Packet Radio System (GPRS) technology is planned for installation in year 2001 as it is imperative that Saudi Telecom not fall behind in introducing these new services and technologies.

Factors such as globalization, membership in the World Trade Organization (WTO), the opening up of segments of the Saudi economy to foreign investment, greater consumer awareness of new services, suggest that customers in Saudi Arabia will also demand the new services. Saudi Telecom has the responsibility of meeting these needs and introducing technology such as 3G, which will aid the overall competitiveness of the country and contribute to its development.

Many challenges lie ahead. Among them are:

- 1) The need to meet the short-term growing service demand with 2G technology and the recovery of that investment over a shorter life.
- 2) The introduction of new technology such as GPRS and 3G.
- 3) The availability of terminal equipment for the new services.
- 4) The rate of subscription for the new services.
- 5) The appropriate pricing and tariffing of the new services.
- 6) Information content which is relevant to the culture of Saudi Arabia.
- 7) Spectrum availability and proper cell planning.

Present plans are for the introduction of WAPbased services and GPRS technology by early 2001. Saudi Telecom plans to continuously study and analyze market developments, both here in the Kingdom and in other countries, so that new services, technologies and applications are introduced in a very timely manner.

7 Conclusions

Great changes have been experienced in the mobile communications market in Saudi Arabia over the past 20 years. The challenges in the past were mainly logistical such as site acquisition, connectivity and billing. The challenges in the future are expected to be technology- and competition-driven. These are expected to be more intense due to worldwide developments in mobile communications. Our challenge is to manage the introduction of services, technologies and applications such that we meet customer needs and maintain and increase our market share in an environment which is expected to be dynamic and competitive.

Appendix 1 – Network features (September 2000)

Network elements

| a) | MSCs | 15 |
|----|---------------------|--------------|
| b) | BTSs | 1,962 |
| | Dual Band | 900/1800 MHz |
| c) | Equipment suppliers | Lucent |
| | | Ericsson |

Customer related

| - | Subscribers | 1,162,794 |
|-----|------------------------|---|
| _ | Average monthly growth | 20,000 (average from 1996 to present) |
| _ | Installation fee | \$400 |
| - | Monthly fee | \$14 |
| Bil | ling | |
| _ | Billing system | ICMS |
| _ | Customer billing | Calling party |

International roaming

| _ | Number of countries | 61 |
|---|---------------------|----|
| _ | Number of operators | 99 |

Appendix 2 – Supplementary services

_ Calling line identification presentation (CLIP)

pays

- Call forwarding unconditional (CFU) _
- Call forwarding on mobile subscriber busy _ (CFB)
- Call forwarding on no reply (CFNRy) _
- Call forwarding on mobile subscriber not reachable (CFNRc)
- Call waiting (CW)
- Call hold (HOLD) _
- Multi party (MPTY) _
- Barring of all outgoing calls (BAOC) _
- Barring of all outgoing international calls (BOIC)
- Barring of all outgoing international calls _ except (BOIC-ex HC)
- Barring of all incoming calls (BAIC) _
- Barring of all incoming calls when roaming _ outside HPLMN (BAIC-Roaming)

Additional services and features

- Operator determined barring _
- Support of DTMF signaling _
- Voice Mail Service (VMS) _

Appendix 3 – Services provided on a trial basis

| _ | Asynchronous Data Service | | |
|--|--|--|--|
| _ | Automatic facsimile gr.3. T | | |
| _ | Internet access | | |
| Ap | pendix 4 | – New services planned | |
| F | Short M | essage Service Cell Broadcast | |
| _ | Wireless Application Protocol (WAP) ISP/Portal Services | | |
| _ | GPRS f | or applications such as WAP | |
| _ | Prepaid | calling | |
| _ | Family Rate Plan Service | | |
| _ | Support | of localized service area | |
| Appendix 5 – Map showing service coverage (General layout of the GSM network) | | | |
| See | Tollowin | g page. | |
| Ap | pendix 6 | – Glossary | |
| AM | ITS | Automatic Mobile Telephone System | |
| BS | С | Base Station Controlled | |
| BT | S | Base Station | |
| GP | RS | General Packet Radio System | |
| ICN | AS | Integrated Customer Management System | |
| MC |)PTT | Ministry of Post Telephone and Telegraph | |
| MSC Mobile Switching Center | | Mobile Switching Center | |
| SN Service Node | | | |
| SRS | SRS Subscriber Radio System | | |
| TE | TEP6 Telephone Expansion Project No. 6 | | |
| WA | WAP Wireless Access Protocol | | |
| WL | L | Wireless Local Loop | |
| 3G | | Third Generation | |

Second Generation

2G



General layout of the GSM network in Saudi Arabia

Solomon Islands



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Telecommunication Development Activities

1 Introduction

The Solomon Islands, as an Island nation, have a very vast sea area, and because of the vastness of this sea area, the Solomon Telekom Company, the only telecommunication company that provides telecommunications for the nation, has a very difficult task in providing telecommunications to rural areas, where 90% of the Solomon Island population dwells. Distance between the many islands of Solomon Islands has made it very costly to provide communications to the rural areas, and thus very expensive for rural people to pay for the services. Therefore, communications in this nation are mostly in the urban and surrounding areas where commercial activities take place.

Despite these problems, the Solomon Telekom Company has and will continue to do its best to provide telecommunications to the citizens of this nation. Solomon Islands, as an underdeveloped nation, is still trying its very best to provide communications to its mass population and therefore has not gone very much into the very latest telecommunication technologies. Telekom has a Development Division which plans and implements its development plans; however, for the last two years very little development has taken place. This is because the nation has had ethnic unrest for this period, therefore all the following projects, which were planned to be implemented, have all been put on hold.

2 Network expansion rural telecommunications

IRT Rural Telecommunications

This is a rural telecommunication project, which aims at extending telecommunications to the rural population. The first phase of this project will involve installing more than 1000 radiotelephones in most of the bigger villages and provincial centres around Western and Choiseul Provinces. Work on this project should have started during this fiscal year; however, as mentioned in the introduction, project work was halted because of the unrest in the country.

The second phase of this rural telecommunication project is to provide communications to rural communities around Malaita Province.

New telephone exchange for Munda

This is a new site, which at present is being serviced by subscriber long lines from a nearby exchange at Noro. These lines are fed to this site or station via a 2 Mbit digital microwave radio. The proposed project for this station should involve the installation of a CSND (remote line concentrator) via a 2 Mbit-microwave radio system from Gizo, which is the Western Province centre.

New telephone exchange and satellite station for Taro station

This project is aimed at expanding the telecommunications to reach the Choiseul Province, which is in the north part of Solomon Islands. This part of the Solomon Islands has never had any proper communication services. Currently, it is being served by HF radio sets and two satellite terminals. The project, if implemented, will involve installing a new digital exchange and a new satellite station. Also, a new underground line plant will be installed, as this satellite is a new provincial centre for Choiseul Province.

3 Network upgrade projects

Auki upgrade

An old Neax61 digital switch, which was installed seventeen years ago, is serving Auki, the provincial centre for the Malaita Province. The system has not had the capability to provide ISDN and other customer facilities. Therefore, it was planned to change the Neax system with a new Alcatel OCB 282 Compact system. The OCB system has the capability of providing these customer facilities, and also with the system using C7 signalling which we already have on some of our different routes, switching should be fast and efficient. Again, this new switch will also cater for the second phase of the rural telecommunications that Telekom hopes to undertake. It is planned that one or two CSND, (remote line concentrators) will be installed in the provincial sub-centres that are around the province.

Noro upgrade

The Noro site is currently served with a Neax61S system and, like the system in Auki, although they are digital exchanges, these cannot provide modern customer facilities like data switching and ISDN. These facilities are important as this site is one of this nation's international ports and it also accommodates the only fish cannery. Proposed equipment for this Noro site will be a CSND (remote line concentrator). It will be connected

back to the Gizo exchange via a 2×2 Mbit-microwave radio system.

Internet and data services

This service has been introduced recently and the service is steadily growing. However, this service is mainly used by companies and a few individuals. Currently, frame relay equipment is now being installed here to raise the level of data customers communicating with the outside world. This will be connected via Telecom New Zealand.

4 Conclusion

Solomon Telekom Company has over the years endeavoured to improve and provide telecommunication services to its urban and rural areas. Improvement of the network involved the installation and commissioning of a Voice Management System and Mobile Management System. All the projects that were planned should have been implemented during these next two fiscal years; however, this nation has had two years of social unrest and therefore none of the projects were implemented. Also, because of this ethnic unrest that the nation has gone through, some parts of the existing network were either destroyed or have sustained damage. This damage will take some time before the situation can be restored to normal. therefore, all development project implementation will depend very much on the restoration of the existing network.

Thailand



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Mobile Communications Opportunities in Thailand

The Communications Authority of Thailand (CAT) is a state-owned enterprise under the Ministry of Transport and Communications established since 1977. The main responsibilities are to provide postal services and telecommunication services. As a governmental organization, CAT has committed itself to the development of the country's communications infrastructure. Since its creation, CAT has invested a large amount of capital in constructing the telecommunication networks in all parts of country. Also, the organization is involved in the establishment of several international satellite and submarine cable and switching networks to ensure connectivity between its customers and the rest of the world.

CAT's mandate is to operate all telecommunication services except the domestic fixed-line telephone service, which is the responsibility of the Telephone Organization of Thailand (TOT). At present, Thailand's telecommunication sectors are monopolized by the two government agencies, but private firms are allowed to operate in the industry on a Build-Transfer-Operate (BTO) basis, which is within the boundary of existing laws and regulations. This means private companies can provide telecommunication services through concessions and Joint Ventures from the government agencies.

The cellular mobile telephone service that is provided by CAT is one of the most important services in the mobile communications field. Listed below are the types of cellular systems available in Thailand and the corresponding service providers.

| | System type | Provider |
|---------|----------------|----------------------------|
| | AMP800 Band A | CAT |
| Analog | AMP800 Band B | CAT, TAC |
| | NMT470 | ТОТ |
| | NMT900 | AIS (under TOT concession) |
| | GSM900 | AIS |
| Digital | PCN1800 (TDMA) | TAC, CAT, DPC, WCS |
| | CDMA800 Band A | САТ |

The demand for the service has been increasing very rapidly since the start of service. The total number of subscribers is approximately 2.4 million (as of February 2000). However, the CDMA 800 system has merely 4,000 subscribers as the network covers only the Bangkok metropolitan area and part of central and eastern Thailand. CAT just has received an approval from the Government to expand the CDMA network all over the main provincial area (e.g. northern and southern part) in Thailand and is currently planning to set up a new cellular mobile telephone network in 2001. Operating in the 1900 MHz band, the network will be jointly owned by TOT, CAT, and Aeronautical Radio of Thailand, Ltd.

Mobile communications as a means of enhancing universal access

In 1999, some 50 million new mobile subscribers were added in the Asia-Pacific region. Many of these are using pre-paid services. The main advantage of this service is greater ability to control expenditure. For these users who have the drawback of having the receiving-party-pays system, if they do not switch off their handsets, they are required to pay for incoming calls from their allowance. As mobile communications have shifted from being primarily a business service to one of personal use, resistance to receiving-party-pays appears to have grown. This seems to be one explanation of why the growth rates for countries with calling-partypays have markedly outstripped those with receiving-party-pays in recent years.

For receiving-party-pays, a critical factor is that users have to budget pre-paid airtime of incoming and outgoing calls. This factor may not be as much of an obstacle for pre-paid cards as for other prepaid options. For example, if a user runs out of time on a pre-paid card, they can purchase a refill, in markets with receiving-party-pays, assuming that this is conveniently available. However, in the case of relatively small amounts of monthly prepaid airtime, the rates increase substantially after the inclusive airtime has been consumed. Accordingly, users pay higher rates if they do not budget their airtime to allow for incoming and outgoing calls. However, in Thailand, the receiving-party-pays service has not yet been launched by any company until now. The cause is the calling-party-pays is fairer in billing than the receiving-party-pays. The users are not required to pay for incoming calls.

In Thailand, two communication companies launched the "one-2-call" and "Prompt" services as the "prepaid service system". Both of these services, with about 95,000 subscribers, do not required registration, have no monthly or other services fees and no bill. The customer can control the cost by rebilling the system and can use it in only 3 minutes.

So, this new development can affect the number of mobile users. If the users are satisfied with this service, it means that the number of mobile customers will increase. As the result, it will enhance universal access because the mobile communication users in the future demand access to the world of communication, information and entertainment.

When will mobile overtake fixed-line?

Convergence between fixed and mobile seems to be impossible today, although mobile companies continue to appeal to their customers to use the mobile that travels with them everywhere. However, the integration between voice and data is hard to achieve because most people today still use different communication tools—mainly the telephone and the PC, which separate voice and data. So, the trend of convergence in the future is neither the integration of fixed and mobile networks nor the combining of voice and data. It is the integration of technology and software into usable applications. Convergence happens at the point of the user, and not necessarily in the communications networks.

Actually, the factor that makes convergence become reality is dependent on the relationship between those that act as enablers and those that are drivers. The key driver for convergence is user convenience that is being enabled by technology, competition, price. The advanced technologies cause competition between vendors and service providers to be the first to get products and services that facilitate convergence, further stimulating the acceptance of these products into every use.

However, when mobile will overtake fixed-line is hard to predict. It is dependent on two factors. The first factor to impact the speed at which the concepts of convergence turn into a reality are standards and regulation. They help avoid the launch of many conflicting and incompatible products and services onto the market. Moreover, the another important factor is the technology impact of the communications companies because the ability to support integrated use applications is dependent on advances in technology.

How will it change lifestyle?

The mobile telephone services will significantly expand the range of options available to users and allow communication, information and entertainment services to be delivered via wireless terminals. The exciting thing is that the foundations for these services have already been laid down in the shape of today's digital mobile phone networks. All that is needed to support these advanced multimedia services is to expand the information capacity, or 'bandwidth', of the radio communications technology.

Will current mobile-fixed interconnect agreements hold back mobile companies from providing lower cost services?

PCT services is one of the telephone services in Thailand. This service is the result of a merger between PHS technology (Personal Handy Phone System) from Japan and AIN network technology from Germany. This telephone can act as the ordinary mobile telephone while it uses the fixedline network and has its telephone number as same as the fixed-line telephone at home. Although PCT is just like a value-added service on top of fixedline services, it also is treated as a mobile service. In the trial period, there were 110,000 trial subscribers that could use their handsets free of charge for local calls. Then the PCT service received an many responses from the public, with over 100,000 new subscribers signing up during the first few weeks of the launch in Novermber 1999. The PCT operating company expects that they will have about 400,000 PCT customers by the end of this year.

While the disadvantages of PCT is the limitation of mobility on coverage area, the advantage is its low handset price and tariffs that are below those of cellular. In addition, there is another private company operating PCT service and offering a low monthly fee of just 300 baht cheap airtime. So, the competition between PCT and this cellular company will stimulate the other cellular companies to reduce their service fees in the future.

Shortly, mobile can overtake fixed-line in the future. However, it depends on many factors such as standards, regulation and technology impact. In addition, advanced mobile technology will change lifestyles. The mobile telephone services will allow communication, information and entertainment services to be delivered via wireless terminals. It means our lifestyle will more convenient. Moreover, mobile communication companies will provide lower service fees. For example, today, the PCT system stimulates the other cellular telephone companies to reduce their service fees because of competition in the market.

Third-generation (3G) mobile: Toy for rich or tool for development?

The mobile phone is the fastest-selling communication device of all time. By 2005, there will be one billion mobile users around the world. The other expanding area of technology is the Internet. So, the next-generation technology should combine high-speed access and Internet-protocol based services to support many users in the future.

Can it become a mass-market service in the future?

The third generation is designed to provide the aggregate throughput and real-time transport guarantees that are needed for multimedia applications. This technology combines high-speed mobile access with the Internet Protocol (IP). Its services will add an invaluable mobile dimension to services becoming an integral part of modern business life such as Internet, video-conferencing and interactive application sharing. Therefore, 3G is not just about applications that require high-speed data rates. It is about convenience and speed of access. Because of these advantages, there will also be a growing need for mobile users to interact with machines, and for machines to interact with other machines, over radio connections – reporting faults, ordering new stock, or relaying location details whenever required. Furthermore, companies outside telecommunications today will take advantage of 3G to develop innovative new services. For this reason, the thirdgeneration technology can become a mass-market service in the future.

The first step towards international mobile Internet and third-generation technology is been by WAP (Wireless Application Protocol) and I-mode which is growing very fast in Japan. In Thailand, the market or the end users have not yet been fully educated and the demand does not truly exist. With these facts – no demand for access to high-speed data transmissions, lack of content support, no aggressive promotional campaigns to the mass market, and the expected high access charges for WAP phone users – the popularity of WAP phones will be held back at least a year. However, Thai operators cannot resist the global trend as wireless technology evolves.

Will mobile communications provide the primary form of access to the Internet and broadband services?

Now mobile operators are working with their equipment suppliers to test this global standard to allow mobile phone users to access the Internet. After testing, they are scheduled to launch WAP-based or mobile Internet services by the end of this year. One telecommunication industry source has claimed that although WAP has been announced as the way forward in the rapidly-changing telecom race, and much of the region will finally understand this, most mobile phone users in Thailand have no idea of what WAP is. They will continue to use their mobile phones just for voice and short messages. Moreover, industry sources also said that WAP technology has not yet fully evolved. For this reason, some manufacturers, such as Dutch electronics manufacturer Philips, are still unwilling to launch WAP phones. For its part, Philips is focusing on mobile phones with voice control, though Ericsson expect half of all wireless phones in the world to use WAP technology by 2001.

Current WAP access is text-based, being too slow for video and graphics. WAP phones now are limited to data transmission speeds of 9.6 kbit/s, far slower than the speeds available through conventional modems on today's PCs. However, WAPenabled phone manufacturers like Nokia, Ericsson, Motorola, Siemens and Alcatel were fast to try to educate the Thai market through the introduction and promotion of various models of WAP phones and their advantages. In addition, they were also working with content developers to provide compatible products and services across a wide variety of platforms.

Shortly, 3G technology can be the mass-market service in the future because mobility with 3G will

be built into many services for supplying the demand of users. However, in Thailand, neither the market nor the users have yet been studied. Moreover, mobile communications will provide the primary form of access to the Internet and broadband services because of its feature for supporting high-speed mobile access with the Internet Protocol (IP).



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Meeting the Challenge of the New Economy

1 Introduction

Tonga is one of the smallest Kingdoms in the world with a population of around 100,000. It is situated in the heart of Polynesia between latitudes 15 and 23.5 degrees South and 173 and 177 degrees West. The country comprises some 170 small islands scattered over more than 250,000 sq. km of the Pacific Ocean, out of which only about 40 are inhabited.

Tonga is geographically isolated from the main hub of the New Information Economy. However the Government of Tonga understands that it cannot afford to be a mere spectator but rather it must be an active player in the New Information Economy. This can only be realised with good and reliable telecommunication services (voice and data) available.

Therefore, substantial investment had been made in order to improve the network infrastructure in the past few years.

2 Country profile

| Area | 699 sq. km |
|-----------------------|---|
| Population | 97,784 |
| Urban population | 21% |
| GDP | US\$ 98.8 m (1997/98) |
| Telephone density | 9% |
| Main telephone lines | 9200 |
| Waiting list | 5000 |
| Cellular customers | 224 |
| Internet customers | 541 (August 2000) |
| International traffic | 2,289,100 minutes (outgoing – 1997/98) |

3 Building the Infrastructure

The following projects have been recently completed to upgrade the domestic telecommunications infrastructures in Tonga.

a) Domestic satellite (DOMSAT) project

This project uses satellite links to connect the main island (Tongatapu) and the four main outer islands, namely Ha'apai, Vava'u, Niuatoputapu and Niuafo'ou. It replaces the HF radio and Troposcatter systems which were used for inter-island communications.

Links to Ha'apai and Vava'u use Intelsat IDR while links to Niuafo'ou and Niuatoputapu use DAMA technology provided originally by Telstra (Australia) who subsequently sold it to World IT.

b) Completion of Ericsson AXE-106

Through efforts to ensure Y2K compliancy of the national networks, the telephone exchange on the main island was successfully upgraded from a hybrid Ericsson AXE103 to a fully digital Ericsson AXE106.

Furthermore, the Remote Subscriber Station (RSS) in the three main districts of the main island (Masilamea, Pea and Mu'a) were also upgraded from analogue to digital.

Lastly, an Access Node Switch (ANS OPS) was also installed although not yet fully completed. This system will provide a more efficient operator services and will also provide call conference and call booking services.

Tonga

c) Increasing access via land lines and fixed cellular

There have been some increases in the number of subscribers connected. This was made possible by the laying of new copper cables, radio and utilizing the Pair Gain System Technology.

Fixed cellular phones were deployed in areas where landlines are not available.

Currently, the penetration ratio is now slightly more than 9%. The population of Tonga is close to 100,000.

The above developments had to be made possible due to increased demand from customers to have access to telephony services. The waiting list is more than 5,000.

Lastly, Tonga is now working on plans to offer high-speed data transmission services in the near future. The new AXE106 switch has ISDN capability, and the appropriate technology to use – such as ADSL – will be decided in the near future.

d) International link

Tonga is linked to the outside world via satellite with direct digital links to the following countries: Australia, Hawaii, Hong Kong, New Zealand, and United States of America (USA).

4 Bridging the urban-rural divide

As indicated above, Tonga is made up of many islands scattered in the midst of the Pacific Ocean. While telecommunications are not the panacea for the slowing down of migration to urban areas, it is definitely an essential element of the solution.

The reliable telecommunications that are now available in the outer islands play an important role in the success of other ventures by the Government of Tonga to counter migration to the main island.

Tonga had completed the first phase of its development for its domestic networks when the DOMSAT project and the upgrade of AXE103 were completed.

Tonga has now embarked on the second phase of its development. This phase involves the connecting of more subscribers in the rural areas of the main island and the remote islands of the outer islands. The current number of lines is 9200 and the expected target is shown in Table 1.

| Year | 2000 | 2001 | 2002 |
|-----------------|-------|--------|--------|
| Number of lines | 11,83 | 12,935 | 14,490 |

New subscribers in rural areas are connected utilizing Pair Gain technology and using fixed cellular services.

The connection of customers in remote islands of the outer islands is still at its planning stage. This is a real challenge considering the cost and the remoteness of the islands. However, Tonga is confident that it will be able to find technology that will be feasible for these areas in the near future.

5 **Providing affordable services**

The following services are now available in Tonga: International Direct Dialling (IDD), Packet Switching, Facsimile, Payphone, Telephone Prepaid Card Services, Mobile Telephone, Telephone Operator Assistance, Private Lease Circuits, Frame Relay, e-mail and Internet. For some of the services, such as IDD, the tariffs have not been changed in the last twenty years. However, this is going to change very soon, as the Government will de-regulate the telecommunication sector to allow competition to take place. This initiative will ensure that competition will push the quality and the reliability of the services to a much higher level at a lower cost than that which is offered today. Above all, the deregulation of the telecommunications sector will offer the customers the right to choose what is best for their money.

6 **Promoting convergence**

The Internet service was introduced to the Kingdom of Tonga in 1997 and it accesses the Internet main backbone via two dedicated links, i.e. one directly to the USA (128 kbit/s bearer) and the other one to Australia (256 kbit/s bearer). This is the area where small countries like Tonga will be able to participate in the New Economy, such as e-commerce, and the convergence of technologies and services. To develop and promote the Internet service in Tonga, there is now a plan to reduce the tariff for these services (including for the schools), increase the bandwidth of the Internet link to the USA and allow more services to be carried on the Internet, such as fax, voice (VOIP), etc. Tonga is currently reviewing its Telecommunication Acts to speed up the processes of developing its broadcasting and communications industries. These processes will include the creation of a Ministry of Communications, the privatization of the Government-owned telecommunication companies, the introduction of competition and packages to attract foreign investors.

7 Convergence and the Global Information Society

For most small countries in the Asia-Pacific region, the only way of accessing the Internet and broadband services is via satellite due to the fact that linking up with the existing or planned submarine fibre optic cables will be very uneconomical. Small countries, like Tonga, will be able to link up directly to the global network via satellite, e.g. Tonga is currently connected to the Cable & Wireless Global IP networks via the INTELSAT satellite. However, the availability of the bandwidth and the cost of the carriers will be the major deciding factors in providing the broadband services for small countries in the Asia-Pacific region. Therefore, in order to minimize the effect of these factors, better digital compression techniques will be required to improve the utilization of the bandwidth and at the same time reduce the cost of the satellite carriers.

8 Conclusion

In the last three years, Tonga has been able to digitize all its telephone exchanges and its inter-island links. Also in the same period, it introduced the Internet and frame relay services. This shows that although a small island like Tonga finds it hard to keep up with the fast pace of the development in technology, it does not want to be left behind either. That is why Tonga has quickened up the development of its infrastructure in the last three years to be able to handle the convergence of technologies and services.

External pressure to reduce tariffs is one of the big problems that faced the small islands. The small islands in the Pacific do not have the economy of scales that big and developed countries have. Therefore, reducing of the tariff rate will make it difficult for the small countries to recover their investments and at the same trying to develop their telecommunication infrastructures. This is the area where the small islands will definitely need the help and assistance from the developed countries.

There is no doubt that, in the very near future, Tonga will be able to build a better and bigger information superhighway to the Global Information Society so that its community can benefit from the Global Economy.

Tuvalu



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Facilities and services in Tuvalu

1. Overview

1.1 General

Telecommunication services in Tuvalu are administered and operated by the Tuvalu Telecommunications Corporation. The Tuvalu Telecommunications Corporation (TTC) is a state-owned corporation established in February 1994. The trend of commercialization came into effect when the Government decided to commercialize the services that could be performed by the private sector.

1.2 Geographic

Tuvalu comprises nine atolls situated in the Central Pacific Ocean between latitudes $5-11^{\circ}$ S and $176-180^{\circ}$ E longitude. The total land area is 26 square kilometers scattered over an area of 1.3 million square kilometers. The total population is 9,601 according to the last census, which was in 1998.

The atolls seldom rise more than 4.5 meters above sea level. Only two islands are accessible to ships; elsewhere there is no anchorage except in the calmest weather when landing is possible by small boats over the reef or through small channels cut into the reef.

1.3 Climatic

The annual rainfall is on average 3.5 meters and there are no marked wet or dry, or hot or cold seasons. The average temperature is 30 °C and the mean monthly relative humidity is 80% for all months of the year.

From December to May, strong westerly winds blow but for much of the year trade winds blow from an easterly direction. Although Tuvalu lies north of the hurricane belt, the islands have been struck in the past by severe cyclones, most recently by Hurricane Bebe in 1972.

1.4 Population

At the time of the 1991 census, the population of Tuvalu was 9,061 distributed as follows:

| Nanumea | 818 |
|------------|------|
| Nanumaga | 644 |
| Niutao | 749 |
| Nui | 608 |
| Vaitupu | 1205 |
| Nukufetau | 756 |
| Funafuti | 3836 |
| Nukulaelae | 370 |
| Niulakita | 75 |
| | |

2. Situation of Tuvalu

2.1 Role of telecommunications

The importance of telecommunications in any society is indisputable, whether in relation to business and administration, or to developmental, social or cultural activities. This is especially so in the case of small island developing countries, with rugged environmental conditions and economic limitations where telecommunications make a significant difference to the obstacles to be overcome.

The ready availability of reliable, efficient communications at affordable cost is a vital factor in effective local and national development programmes.

Telecommunications also make a significant contribution in maintaining family and community ties in rapidly changing times, in aiding the preservation of traditions, fostering cultures and generally improving the quality of life to the population as a whole.

It is therefore the common national objective to provide public telecommunications as a financially viable operation. Small developing countries, which do not have the population numbers or the economy to generate the levels of traffic and revenue required to achieve this result, must necessarily give greater cognizance to the wider benefits for the community to be derived from having adequate telecommunications.

2.2 National objectives

Recognizing the importance of telecommunications towards the ongoing development and prosperity of the nation, the Tuvalu Government identified, as objectives in the telecommunication field, the need to:

- improve internal and external communications;
- maintain and operate national and international telephone services to meet the needs of the public and the administration;
- provide a local telephone network on Funafuti to meet the needs of the administration and public;

Emphasis is being placed on meeting the needs of rural communities in the outer islands and in particular on the probability of using satellite communications for domestic services.

With provision of good quality telephone services, rural communities could expect to benefit in a variety of ways. These would include a significant reduction in expensive and time-consuming travel to and from the outer islands, substantial saving of time taken to conduct business affairs, enhanced marketing opportunities for rural produce, improved interchange of government information and better health, education and emergency services.

2.3 Administration

Provision of telecommunication services in Tuvalu is the responsibility of the Tuvalu Telecommunications Corporation (TTC), a state-owned corporation.

It is responsible for providing and maintaining national and international public telecommunications including telegram, telephone and any new services that become available.

3. Existing facilities and services

3.1 General

The Tuvalu Telecommunications Corporation is the sole provider of telecommunication services in Tuvalu. It is controlled and managed by a Board of Directors consisting of five members of whom one shall be the representative of the Government and four, with relevant experience, shall be from the public. The Chief Executive of the Corporation is the General Manager appointed by the Board with the approval of the Minister responsible for telecommunications. The General Manager will be responsible to the Board for the effective operation of the day-to-day activities of the Corporation.

3.2 Internal telephone service

A new digital telephone exchange (Ericsson AXE 106) with 1024 capacity has recently been installed and upgraded to remain compatible with the Y2K problem. The digital telephone exchange replaced the 120-line capacity PABX type electronic exchange that was fully utilized just a few months after its installation.

The HF radio system on the outer islands that provides the national telephone service has now been replaced with a satellite system. There is currently one satellite station on each of the eight islands providing telephone services to the public. The system is a leased transponder from Intelsat 176° E providing both national and international communications. The Hub station is at Funafuti, the main capital island.

The system is solar powered as there are no mains on any of the islands. There is a public fax service at the communication centre, which is used by all members of the public. There is no other facsimile equipment installed on any of the islands.

The old HF system is used as a back-up when the main satellite communication system fails. However, these are being gradually phased out and replaced with Inmarsat terminals. One of the islands is using this terminal; the remaining ones will soon be equipped with the terminals.

There are also small telephone exchanges (RedCom) on each of the islands providing the telephone service. Cable reticulation on all the islands is underground.

3.3 International telephone service

International telephone service is by means of satellite via Telecom New Zealand Ltd. The International Data Rate (IDR) link (512 kbit/s) provides one dedicated 64 k for our ISP, the remaining seven are being compressed to provide fourteen circuits altogether. The IDR is on the 176° E Intelsat satellite and provides all our international telephone service.

There are currently two Permanently Assigned Multiple Access circuits on the Vista network in the 174° E Intelsat satellite. The Pacific Area

Cooperative Telecommunications (PACT) network, a shared network between regional countries, is no longer operational and is being replaced by our IDR to New Zealand.

3.4 Facsimile service

There is a public fax service at the communications centre and most government departments have had facsimile equipment installed. Facsimile transmissions are treated in exactly the same way as international telephone calls.

3.5 International Service Provider (ISP)

The ISP was installed in March of this year. There are currently more than 200 subscribers; with this trend, we believe the number of 300 subscribers will be reached by mid 2001.

3.6 Leased services

For its FM broadcast, New Media utilizes part of our leased capacity. The leased capacity is invoiced and payable by New Media to TTC. TTC is expecting the Airline to lease one 64 k dedicated circuit for its reservation system. This is also invoiced and payable to TTC. TTC expect more leases in the coming future.

3.7 Reticulation

The reticulation on the main island and the outer islands is underground, in pvc. The conduits are the best option as they protect the cable from deterioration.

3.8 New administration complex

TTC staff are currently accommodated under three different roofs. This is very inefficient and inconvenient in the coordination of staff. The new office is almost completed and would be able to accommodate all the staff. The project was fully funded by TTC under its operating budget. It is expected the TTC will move to occupy the new administration complex beginning of December 2000.



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Telecommunication network development in Uzbekistan

The Republic of Uzbekistan is situated in the centre of the Asian continent. The territory of Uzbekistan is 447.4 thousand square kilometres. The population is 24 million people.

Uzbekistan

The Republic of Uzbekistan administratively consists of 12 regions and the Republic of Karakalpakistan. Tashkent, the capital of the Republic of Uzbekistan, is one of the largest industrial, scientific and cultural centres of Central Asia. The population of Tashkent is more than 2.5 million people.

The geographical location of Uzbekistan is very advantageous from the geopolitical point of view. Since ancient times, Uzbek land has served as a specific bridge for trade and cultural links between countries of the world.

Its geopolitical situation, advantageous climate, significant unique mineral and raw resources, large reservoirs of strategic materials and agricultural products create the potential for external economic activity and provide Uzbekistan with access to world markets. More than 2.7 thousand perspective deposits of minerals including about 1000 types of mineral resources have been discovered. Uzbekistan takes one of the leading places in the world in reservoirs and extractions of gold, other mineral and raw materials, and it occupies the second place of export of cotton fibre.

Further development of the economic branches of Uzbekistan and its integration into the world economy require a developed telecommunication network in the country.

In accordance with the National Program of Reconstruction and Development of the Telecommunication Network of the Republic of Uzbekistan covering the period up to 2010, the systematic work of technical reconstruction and modernization of the telecommunication networks will be fulfilled.

Fulfilment of the National Program of Reconstruction and Development of the Telecommunication Network of the Republic of Uzbekistan being implemented with the support of the Government of Uzbekistan which is providing a system of legal guarantees and privileges for foreign investors, creating a favourable investment climate and reliable protection of investors' rights.

The modernization of the telecommunication network of Uzbekistan is implemented mainly by a wide attraction of foreign investments. The Telecommunications Administration of Uzbekistan closely cooperates with the German Bank KFW. By using the credits of this Bank, the national segment of TAE Fiber-Optical Line of Communications has been built as well as an international switching centre for 18,000 channels in Tashkent, as well as digital ATS in Tashkent and other Uzbekistan cities.

The Telecommunications Administration of Uzbekistan also cooperates with the Japanese Fund for Foreign Economic Cooperation (OECF) which provided privileged long-term credit to modernize and develop telecommunication networks in Uzbekistan within the framework of OECF-1 project. According to this OECF project, the construction of digital switching stations in the telecommunication network will be completed in three regions (Khorezm, Navoi and Bukhara) and in the Republic of Karakalpakistan.

The modernization of the long-distance network of the country was also implemented within this project. Thanks to the above-mentioned credits, modernization and development of telecommunication networks in Uzbekistan cities is rapidly being achieved.

During the last two years the following were put into operation in the Republic: fiber-optical line of communication: 1700 kilometers; digital microwave lines: 653 kilometers.

Today, Uzbekistan is able to provide modern, highquality services of different types to all customers.

Putting the tran-Asia-Europe Fiber-Optical Line of Communication into operation as well as achieving the first step of the OECF Project allowed links with all regional centers in the country to be digitalized. The number of main digital channels is 60% of the total number of internal channels. The automation level of long-distance telephone links reaches 90%.

During the period of 1994-2000, digital switching equipment for 660 thousand lines was established and local telecommunication network digitalization reached 40%. In 10 regions out of 12 in the Republic, digital long-distance switching centres were established. Based on SDH technology and the Fiber-Optical Line of Communication, reconstruction of about 1.5 thousand kilometres of telecommunications lines was implemented.

At the present time, the telecommunication network of the Republic of Uzbekistan has been equipped with switching equipment with a total volume (capacity) of 1.9 million numbers, including 0.4 million numbers in rural areas. Teledensity per 100 inhabitants in Uzbekistan is equal to 7.5 telephones (in 1996 it was 6.4).

A National Data Transmission Network was created, and the capacity of its channels to Internet

was increased 30 fold during the last two years. Four Joint Ventures and two companies with 100% of foreign capital, which operate using GSM and AMPS standards, provide cellular services.

The National Program of Reconstruction and Development of the Telecommunication Network of the Republic of Uzbekistan, confirmed by the Government in 1995, provides further development of the telecommunication network, as 60% of the population in Uzbekistan lives in rural areas and the tele-density level is still low there. The National Program provides development of the telecommunication network in rural areas during the third step (2005-2010).

According to the National Program, 100% digitalization of the network is planned by 2010 as well as increasing telephone numbers to 4.5 million (corresponding to 13.4 telephones per 100 inhabitants).

There is a favourable situation in the Republic of Uzbekistan for foreign investments. Great privileges for foreign investors, stipulated in accordance with the legislation and restructurazition of the branch, create a real basis to attract foreign investments.

In order to increase the effectiveness of the telecommunication system's management and functioning, and to attract strategic investors to develop and modernize the network, the restructurazition of that branch has been made. A single joint stock company, "Uzbektelecom" was created by the merging of local, long-distance and international network carriers.

Since Uzbekistan became independent, about US\$ 4 million have been invested in the development of telecommunications.



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The role of the Internet in Viet Nam

Introduction

The world has been changing from an industrial society into information society as we are entering the new century. Technically, this change into the knowledge economy marks a transition from the analog economy to a digital one. Some new services may change the way of communication between peoples as well as the way of doing business. The global Internet is one good example.

National telecommunications

Viet Nam

Operators:

- Viet Nam Posts & Telecommunications Corporation (VNPT)
- Military Electronic & Telecommunication Company (VIETEL)
- Saigon Posts & Telecommunications Service Corporation (SPT)
- Viet Nam Shipping Communication and Electronics Company (VISHIPEL)

Telecom network:

- The North-South backbone includes two
 2.5 Gbit/s optical fiber cable and one
 140 Mbit/s broadband microwave systems.
- All districts national-wide are equipped with digital automatic exchanges.
- The international telecommunication network includes three gateway exchanges, eight earth stations using Intersat and Intersputnik systems and the 565 Mbit/s T-V-H, 10 Gbit/s SEA-ME-WE3 submarine fiber optical system.

Telecom service:

- Available to approximately 80% of the country
- Various services: public telephone, mobile phone, data transmission, paging, video conferencing, card phone, etc.
- Value-added services include Internet

Internet

In Viet Nam, the government officially introduced Internet services in 1997 with at present five licensed ISPs and about 80,000 Internet users. We consider Internet as an effective and modern electronic medium for providing information services which allow equal opportunity for all people, with of course at least one telephone subscription and maybe plus one personal computer.

In Viet Nam, Internet is considered to be a valueadded telecommunication service and is regulated by the government. Before the introduction of Internet service on the market, the government issued a decree for Internet regulation in Viet Nam. This document provides principles and guidelines for the development of Internet service in the country as follow:

- The development of Internet service must be accompanied by security measures to protect the network and information content transferred over the network. This can be implemented by technology measures and creating awareness for Internet Service Providers as well as Internet Service Users.
- Unlike basic telecommunication services, the market for Internet service was open for competition from the beginning of its intro

duction. The Department General of Posts and Telecommunications has issued one Internet Access Provider (IAP) license and five licenses for Internet Service Providers (ISPs). We hope that with this competition policy the Internet market in the country will develop quickly, and users will have access to good quality Internet service at reasonable charges.

- At present, all Internet Service Providers must be either state-owned businesses, stock companies where the government holds the majority of shares, or stock companies where the government holds special shares. This means that the government may hold a minority portion of shares but still keeps full control of the company, and makes all business decisions and other decisions related to the company.
- Until now, Internet services (Email, WWW, FTP, and Telnet) have been considered to be value-added services, therefore the ISPs are not required to provide Universal Service Obligation for remote country areas. As a result, they all concentrate on large cities where the business is profitable.

E-commerce

Electronic commerce is a new but effective and efficient method of trading; it has been going through a process of extra high-speed growth and development. It can include many economic activities such as digital data exchange between businesses, financial transactions and services, sales services and many others.

In Viet Nam, electronic commerce is still in a primitive stage. Some Internet Service Providers coordinated with a few trading companies to set up a few websites where customers can login. In these websites, customers can look at a limited number of available items with their pictures and prices, then the customers can put in their orders if they wish to do so. After that, the orders are forwarded to trading companies who deliver the ordered products to customers and collect payment in cash form. The revenue generated by this kind of trading is still insignificant in our country.

Several difficulties are facing the developing countries if they wish to develop e-commerce activities. These include the low-level development of the telecom network and services, the habit of traditional commerce, the need for face-to-face discussion and meeting of Asian peoples, and so on. One of those difficulties is the legal aspect of the matter. In this presentation, I will try to present my personal point of view on the legal and regulatory aspect of the telecom sector in developing countries in order to promote electronic commerce applications.

Traditional commerce has been regulated in most countries within their current legal system, where all activities in one commercial transaction have been legally defined. Electronic commerce has the same activities but with a different appearance and may be realized by different means. Generally speaking, the basic conceptions of social relations in commercial activities are always the same as traditional ones but the ways to express them are quite different, and the present legal documents are not yet able to cover all of these. Basic definitions such as market, offer or acceptation, contract, signature, payment proof, must be redefined in the new environment. Almost of legal points of the traditional legal system can still be applied for electronic commerce but some new ones must be introduced.

In order to build a legal documents system for developing electronic commerce, we should pay attention to the following specific characteristics of e-commerce:

- Many activities in the new commercial environment have been already regulated by the present legal system, which regulates the traditional commerce.
- In the new environment, the market is global. The new legal system has to be much more in conformity with international standards than the traditional one.
- In the new environment, the activities are often less material. This requires legal documents to forecast all possible events in order to protect both parties involved in one commercial transaction.
- In the electronic environment, telecommunication networks and services, the telecom operators and the Internet service providers may play an important role as they provide the market for selling and buying and the means of communication between parties. Telecommunication Authorities have to be involved in the law-making process.

At the beginning, relations between parties involved in a new commercial transaction may not be fully clearly presented, and the highest level of legal documents may not be suggested. The new environment could be first of all regulated by some sub-law documents. Later on, when relatively stable, an official high level of legal documents could be issued to develop the sector.

Conclusion

Internet and e-commerce have been accepted and used widely all over the world. This represents both an opportunity and challenge for developing countries. We must be ready to take this opportunity. However, we must also take reasonable actions to minimize or eliminate any risks, direct or indirect, of potential damages which may be the consequence of e-commerce. The government should promote the development and penetration of Internet usage but needs to have an effective form of control over the information flow through the net to filter out undesirable information and its effects on our culture and society.



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Status of Telecommunications in Yemen

Introduction

Yemen is located in the south-west of the Arabian Peninsula. It is bordered by the Gulf of Aden to the south, Oman to the east, Saudi Arabia to the north and the Red Sea to the west. The total surface area is about 520,000 square km with about 4.3% of the area cultivative. The climate is tropical and humid in the south while in the north it is influenced by the south-west monsoon, with abundant rainfall, subtemperate in high lands and tropical on the coastal plains. The population is about 17.5 million, with about 75% living in rural and remote scattered areas.

Telecommunication development

It was toward the late eighties that telecommunications in developing countries were recognized as a vital factor in the national socio-economic development. Before that date, they were seen at as a luxurious commodity and/or an extravagance.

In Yemen, telecommunication development in the nineties (after unification of Yemen on 22 May 1990) took another shape. The telecommunication sector was given greater attention and was accordingly put among the key national priorities, where a good number of projects were implemented such as upgrading the telephone exchanges capacities, replacement of analogue systems by digital ones as well as replacement of cable plant in certain areas by optical fibre cables.

In May 1992, a new cellular mobile system was installed to cover the cities of Aden, Sana'a and Taiz, meeting the growing demand in these cities. Card phone service was also introduced in Aden. Other mobile exchanges were installed with expansion of cell sites in Sana'a and Hudaidah, Mukalla and Shihr. Rural telecommunication services were provided in a three-phase project. Projects contracted have increased the installed telephone exchange capacity to reach 275,000 lines by the end of 1994. The two operating bodies in Yemen are:

- 1. PTC, Public Telecommunication Corporation: Established in 1990 as a result of the unification of Yemen, merging together the older YTC (North) and Yementel (South). The newly established corporation is a fully governmental enterprise, operating on a commercial basis under a board of directors headed by the Minister of Communications.
- 2. Tele Yemen, a joint venture company established in 1990 under an agreement between the Government of Yemen and Cable and Wireless Ltd. The shareholders are Cable and Wireless 49% and the Public Telecommunication Corporation 51%. International services are operated by this company.

Current telecommunication development is taking place as scheduled or planned in the first 5-year Development Plan (1996-2000). The first 5-year Development Plan was designed to accommodate the continuous growing demand, with a target of telephone density of 2%.

- The switching network is planned to be completely digitized along with 80% of the transmission network.
- The telephone capacity is expected to rise to 500,000 lines by the end of this year.
- Work involves data network expansion.
- Replacement of cable plant by optical fibre systems are main items of the Plan.
- Replacement is foreseen of analogue systems by digital ones.

Yemen

- One of the main objectives of the current 5-year Development Plan is the expansion and upgrading of telecommunication services in the rural and remote areas.
- A new (second) international telephone exchange was opened to provide increased capacity and diversity for Yemen's international traffic.

Internet access service

An Internet access service was introduced in Yemen in September 1996. It is called Y.net service. The international links for Y.net (Internet) for Y.net service were introduced in October 1997. The number of Internet subscribers is about 4,500. The service is provided by Tele Yemen.

Paging service

A paging service was introduced in Sana'a city in 1992. The service was then expanded to other cities and villages as well, where about 97% of the republic of Yemen are served. The number of pager subscribers is about 51,000, using the latest paging technologies. An other ten transmitting stations are planned to be installed in a number of cities in the republic.

GSM service

The Ministry of Communications has recently signed in August 2000 an agreement with Spacetel-Yemen, a Lebanese investment company by which the company is licensed to establish and operate the GSM service in the Republic of Yemen. The investment is about US\$ 100 million. According to the agreement, Spacetel-Yemen will implement the project within the coming few months. Some 500,000 mobile telephones will be installed by the end of the second five-year Plan (2001-2005). According to items of the agreement, the company will build new telecommunication infrastructures to upgrade the local and international services in the country, using the latest high technologies.

Privatization

- The private sector has been invited to contribute in telecommunication investment. Accordingly, two companies were licensed to operate a GSM network in Yemen at a capacity of about 500,000 mobile telephones. It is also expected that other companies may be allowed to provide and operate new services.
- The newly born and widely spread phenomenon of multi-purpose community telecentres is being considered as one form of privatization. These MCTs have evolved in all over the country of Yemen as a consequence of the privatization process, where private sector and small businesses and individuals form small joint venture activities. These MCTs, when equipped with Internet technology facilities, can provide greater potential and a wide variety of information and communication services, which can also be used for training and education purposes. The total number of telecentres installed all over the country is about 750 spread throughout cities and villages as well.
- Mobile telephone sets, paging terminals, telefax, machines and cordless telephones are sold through the private sector.