

17.7.6 IT (Information Technology)

(1) Internet and E-Mail Tariff at IT-spot

IT-spot, which is introduced in the Sum Centre Office, aims to promote Sum inhabitants to utilize Internet and E-Mail, who are low income people and do not have PCs, so applicable tariff for the spot should be free or lower than the normal tariff, about for one year until they recognize usefulness of IT.

(2) Enlightenment Activities for IT-spot

Most people who use IT-spot do not know usefulness of IT and almost illiterate for PC/IT. In order to enlighten them to IT, IT-spot should take actions such as PC /Internet operation lessons (at classroom and/or individually) for them.

17.8 Financial and Socio-Economic Aspects

17.8.1 Financial Aspect

(1) General

Implementation of the Master Plan would lead to the capital investment of U.S.\$ 2,545 per telephone line that is made over the project period (2004-2020), while average annual revenues would be limited to U.S.\$181 per telephone line. This would result in the FIRR of 1.161%. Operating loss continues for 15 years, requiring an annual subsidy of U.S.\$ 2, 467 thousand U.S. Dollars.

Under the above FIRR, financing sources would be limited to grants under ODA, Universal Service Obligations Fund (USO Fund) and the funds from the Mongolian Government including the proceeds from the sale of the Government's shares of Mongolia Telecom Company through privatisation procedures.

(2) Exploration and mobilisation of all available financial resources

Taking into consideration of the above condition, all available financial resources for investment should be explored and mobilised in realistic approach.

(3) Universal Service Obligations Fund

Subsidies such as the Universal Service Obligations Fund, etc. should be indispensable to give a fair competition opportunity to rural telecom operators for new investment and to make up operating losses for the first 15 years of operations under the Master Plan.

Collection procedures and calculation method of USO Fund contributed by the concerned telecom providers should be established in a simple and clear regulation.

Utilisation of USO Fund should be limited to project/new investments and part of operating and maintenance costs for making up justifiable losses arising from Aimag/Sum networks of rural telecom development.

(4) Rental of Backbone Network

The amount of the rental for the use of backbone network should not be higher than the proper annual depreciation expense of backbone network.

(5) Import Duties and VAT

The equipment and facilities of the Master Plan to be acquired under ODA should be exempted from import duties and VAT.

(6) Adjustment of Tariffs

Since February 1997, when the across the board tariffs revision was made, the tariffs have been kept unchanged to date, except for an aggregate of 60% lowering in the international call charge rate denominated in U.S. Dollars and some minor upward adjustments in other services. During the five years, inflation in Mongolia made the effective prices of telecom services deflated by 41% except for the international call, the rate of which is in U.S. Dollars. It may appear that the timing for the next revision of tariffs is already matured.

On the other hand, the incentive should be granted to rural users, for example; in further discounted tariffs from the regular ones for residential users within a capping of certain volume of telephone calls every month (with exception of unlimited discounted tariffs for hospitals, schools and other public service installations).

17.8.2 Socio-Economic Aspect

(1) General

Although it is hard to say that the economic evaluation result (EIRR 5.43%) of the Master Plan proves its viability because of the obtaining circumstances such as the population's socio-economic activities, service level of telecommunications, etc. in the rural areas and thereby caused insufficient supporting data, the economic evaluation suggests that this Master Plan could be fulfilled by the comprehensive development approach under consensus of the government, individuals and firms from the concerned sectors.

(2) Significance of more weight on Socio-Economic Aspect

For the comprehensive evaluation of the Master Plan, emphasis should be placed on socio-economic aspect rather than financial aspect, because the Master Plan intends to respond to the requirements for creating relatively similar living conditions with the urban areas in upgrading telecom services in the rural areas, where commercial investment is very difficult..

(3) Establishment of comprehensive rural development plan

To aim at the increased telecommunications revenues, there should be realised a comprehensive development of agriculture and livestock farming industry, tourism and services industries in the rural areas. As a driving force of rural telecom development, utilization of the potentiality of private enterprises should be promoted by the Government in fostering environment for set-up and growth of SME (Small and Medium Scale Enterprises). Also services of hospitals, schools and other public service installations should be upgraded by enhancing their facilities as well as staff capacity.

17.9 Implementation of Master Plan

(1) Review of Master Plan

This Master Plan should be reviewed in the proper interval (preferably annually, at longest 3 - 5 years) in consideration of the recent speedy technical innovation of the

telecommunications filed, the MOI/PTA's investment results and the changes of the situations surrounding MOI/PTA.

(2) Utilization of Feasibility Study Method

The feasibility study methods and procedures used under this Master Plan Study should be utilized by PTA for the development of the new projects in other Aimags, though the feasibility study were carried out for 3 Aimags within 21 Aimags.

(3) Longer Project Implementation Period

The project implementation period should be settled longer than those in other countries, because the construction and installation work in the fields cannot be done in Mongolia for about half year.

(4) Project Implementation Period under JICA Grant Aid Project

The project implementation period under the JICA grant aid scheme should be settled in two (2) years from the beginning, not single year, in case of application of the Japanese Government Grant Aid, in consideration of the limited work months per year (6 months only) for the actual construction and installation work in the fields in Mongolia.

(5) Utilization of Optical Fibre Cable Transmission System and Radio Transmission System

The existing optical fibre cable transmission system, which was installed under the JIBC loan project and belong to the MRC, and the other new radio trunk transmission systems, which are being under the installation by the mobile operators, should be utilised at most on the commercial conditions basis for the rehabilitation and expansion project of the rural telecommunications system, in consideration of the maximum utilization of the Government property and the avoid of the double investment.

CHAPTER 18

COMPREHENSIVE ASSESSMENT OF THE MASTER PLAN

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COMPREHENSIVE ASSESSMENT OF MASTER PLAN

18.1 General

This Master Plan has been studied and elaborated as a long-term rural telecommunication development plan in Mongolia, in consideration of all aspects of social, technical, economic, financial, management and organisational and environmental protection factors. In order to assure and realise the Master Plan, the respective aspects are analysed and assessed comprehensively in respect of their appropriateness.

18.2 Present Status of Mongolia

(1) Geographic and Demographic Features

Mongolia is an entirely inland country of which total area is 1,566,500 square km (about 4 times of Japan) and is 1,580 metres above sea level. The small rural cities, towns, villages (Aimags, Sums and Bags) are scattered in the wide territory. The environmental temperature becomes less than - 30 C in winter season. The population of Mongolia was 2,379.5 thousand at the end of 2000, out of which 54.0% or 1,284.9 thousand stood for the urban residents (Ulaanbaatar & Aimag Centres), while 46.0% or 1,094.6 thousand stood for the residents of rural areas (Sums & Bags). Current population growth rate of the country is 1.4% on average. The expected annual growth rates of population up to the year 2020 applied under this Master Plan Study are 1.46% in whole country, 1.04% in rural areas and 2.24% in Ulaanbaatar respectively.

(2) Economic Activities

Mongolia is in its process of transition towards the market economy. The government has been closely following sound macro-economic policies, supported by the international donor community. Herding is a traditional way of life of Mongolians and the livestock-breeding sector is occupying about 90% of agricultural products. Thus, the growth rate of GDP in 2000 decreased to 1.1% from previous years 3 - 4% since the country's economy restarted to show positive growth. The expected annual growth rates of GDP and GRDP up to the year 2020 applied under this Master Plan Study are 4.97% and 4.45% respectively.

(3) National Development

In 2001 the Mongolian parliament approved the regional development policy paper “Policy of Regional Development of Mongolia” that contained the elaboration of the regional development to establish the development balance throughout Mongolia by the regional way of development, and to create the appropriate environment for the government structure, economy, society, culture, allocation of population, city construction, international cooperation, state policy coordination structure and operational guidelines promoting rural development in the economic regional areas.

(4) Telecommunication Sectors

The administrative authority supervising the telecommunications business and services in Mongolia is MOI and the implementing agency is PTA. The telecommunications sector of Mongolia is developing in keeping with the basic policy which was set forth in the Mongolian Telecommunications Policy Statement of 1994, and updated by the 1998 Mongolian Telecommunications Sector Policy Statement (MTSPS), based on the Network Master Plan to 2010. The Statement was amended in December 2001.

MOI is to make policies and strategies for development of telecommunications and IT, and also to lead and arrange the implementation. RC is to assist and recommend MOI on the state policy towards communications and in charge of execution of laws, issuance of operation licenses, type approval, complaints, services, tariff, etc., regarding telecommunications operation, services and manufacturing. PTA is to implement telecommunications strategies, network plan, and projects, based on telecommunications development policies decided by MOI. PTA owns all telecommunication facilities on behalf of the State and leases it to MT for provision of basic telephone services, and does not have any stakes of MT.

Telecommunications sector in Mongolia counts two (2) fixed telephony service providers, two (2) mobile service providers and eight (8) Internet service providers. MT now provides all the basic telecommunication services. The network operated by MT is a complete network which covers whole the country, consisting of transmission links, switching systems and subscriber access facilities. The transmission network and switching systems are mostly possessed by PTA and leased to MT.

The fixed telephone land lines, which are mostly of MT network, counted 130,000 for 2.4 millions population, or 5.5 lines per 100 inhabitants as national average as of 2001. The total of land lines and mobile and wireless telephones came up to 358,000. So the national

telephone density recorded 15.0 lines per 100 inhabitants as a total. The majority of mobile phones are registered in Ulaanbaatar, Aimag centres and surrounding cities. Private and national companies render telecommunication services other than the basic ones. The services include mobile telephone service, wireless local loop network service and Internet service.

(5) Telecommunications Facilities

The switching network of Mongolia consists of the PSTN of MT and another PSTN of MRC. The switching systems in Ulaanbaatar are digital. The capacity of existing switching facilities is 141,000 line units in total, including 73,000 line units in Ulaanbaatar. Sum centre's switching system is PBXs and manual consoles. Most of the PBXs are analogue and made in Russia. Many of them were products made in 1980's and 1990's, but switches made in 1970' are also in use.

The national telecommunications backbone network of MT is made up with 4,000 km of microwave transmission link, about 900 km of which is digital. As spur links, over 30,000 km of open wire lines connect Aimag centres to Sum centres. The first optical fibre cable transmission system was introduced in 2000 along the railway, and owned by MRC for their railway business and PSTN services carried by them. The second optical fibre cable transmission system extended from Ulaanbaatar to Aimags in Eastern areas is under the operation now. Open wire trunk transmission systems are still used for four Aimags. Most of Sum centres are connected with Aimag centres by open wire transmission system. Most of open wire routes are still in use for networks in Aimag. The existing open wire system is too obsolete and costly technology and the quality of service is very poor due to high transmission loss for long distance and shortage of channel capacity.

In the areas where terrestrial communications is not feasible and had no access to the optical fibre backbone transmission network system or the digital microwave backbone transmission network system, VSAT provides both data and voice communication with the utmost accuracy and integrity. 19 VSAT satellite earth stations are in operation to improve the rural telecommunications network in remote Aimags from Ulaanbaatar now. While most advanced technologies in transmission are employed in Mongolia, analogue technologies are still widely used in Aimags. Analogue equipment is facing difficulties in maintenance because of spare-parts shortage, and does not totally meet various needs of digital age.

As the wired access network for Sum centres in the rural area, the small size of aerial copper cables are applied. Majority of such cables were deteriorated and of shortage in capacity. In addition to the above conventional copper cable system, a WLL telephone

service was started from January 1999 in Ulaanbaatar. Recently HF and VHF radio transceiver equipment was introduced to Sum centres and Bags for the emergency communication purpose. The current radio transceiver equipment is not able to connect automatically with the PSTN. The international telecommunications network in Mongolia is mostly established by way of the INTELSAT satellite communications network that is based on digital systems.

Majority of the telephone offices in Sum centres is not provided with reliable or stable electricity, either by main or emergency diesel generators or by other sources of power supply. The use of renewable energy with small-scale solar panels makes power supply for the VHF or HF transceivers at the selected Sum centres. The only power supply by utilizing renewable energy at the selected Sum centres is by means of small-scale solar panels for the short-wave transceivers. Some telecom offices at Sum centres are supplied with electricity generated by photovoltaic (PV) systems alone. Telecom offices located at some Sum centres receive power from grids, or Aimag diesel generating (DG) stations, or Sum DG stations. The power supply from DG stations in Sum centre is of a low standard; operating hours of most of the DG stations are limited to night time, thus making it quite difficult to feed electricity to telecom offices on a 24 hours-a-day basis.

(6) Operation and Maintenance and Human Resource Development

The specific features for the operation and maintenance of the telecommunications facilities in the rural areas of Mongolia are that small scale of facilities are scattering in the vast country, aged and old type facilities and the lifetime is over, and transportation is difficult due to poor road and rail way condition. MT is taking their best efforts to improve the operation and maintenance activities and work procedures. Majority of the existing facilities in Sum centres were installed in the year of 1980 and run out of equipment life, and equipment is maintained by minimum number of staff. In the corrective maintenance, it takes longer repair time because of shortage of spare units or parts. The total number of the existing staff of MT is 4,508 at the end of 2001 and the structure features of the staff are that Aimag and Sum level employees are 66.3% of the total, average number of employees per one Aimag is about 100 and about 50-60% out of it is operators, and 356 employees are decreased from 1999 to June of 2002

(7) Institution, Organisation and Management

The MTPS 2001 is targeted to implement the liberalisation of communications sector as well as the principle of non-discrimination in the telecommunications sector by creating an

efficient regulatory system. It stipulates the sector's management, governance and structural organisation, general strategy for the telecommunications sector development, competition and regulation in the telecommunications market, privatisation and investment support of the telecommunications sector, universal service obligations, financial resource, and human resource. The objective of the general strategy for developing the telecommunications sector with the target year in 2010 is to introduce more fruitful investment along with the latest high-tech and technology in Mongolia.

At present PTA manages the big investment projects such as planning, design and construction, because PTA owns most of telecommunications assets of MT, and MT has only operation and maintenance functions, except recently introduced WLL in Ulanbaatar and small expansion by MT. Management in Ulanbaatar is more important than in Aimag and Sum level due to development level and size of profit. Each Aimag and district manages about 10-20 Sums as control tower of rural areas. Sum office is composed of a manager, engineers, technicians, operators, accountants, drivers, etc. with 3-10 employees. MT is using the management indicators such as income and expenditure, new connection, operation and maintenance, billing and collection, human resource, training, etc.

(8) Spectrum Management

In proportion to the growth and expansion of economic and social activities, the radio frequency utilization is dramatically increasing in Mongolia. Many wireless services have been licensed and the illegal radio stations also increased. The improvement and expansion of spectrum management functions and organisation are indispensable matter in Mongolia in consideration of increase of such illegal radio stations. CRC has built and completed the strategy on dividing and using of radio frequencies, planning of channels of the national resource within the framework of the international frequency allocation decided by ITU. In order to use effectively radio waves of limited resource, the following actions will be taken:

- (a) Speed up of digitalisation of radio frequency equipment and communications system;
- (b) Introduction of frequency re-use technology and transition to new frequency band;
- (c) Development of unused radio frequency band;
- (d) Introduction of centralized and computerized radio spectrum monitoring system; and
- (e) Rehabilitation and improvement of frequency monitoring station.

18.3 Development Framework and Strategies

(1) Objective Areas and Facilities

The telecommunications system in Mongolia consists of (i) international telecommunications facilities, (ii) local telecommunications facilities in the capital city and the rural major cities (Aimag centres), (iii) trunk transmission facilities to connect the capital city and the rural major cities, (iv) local telecommunications facilities in the rural towns and villages (Sum centres) in Aimag, and (v) local transmission facilities to connect the rural major city and the rural towns and villages. This Master Plan covers the areas and facilities of the above (iv) and (v) only.

(2) Main Purpose of Rural Development

The rural telecommunications network development is essential to improve such basic needs of life as education, medical care, etc. In consideration of the most important social issues in Mongolia to solve the imbalance found between the urban and rural areas, the Government of Mongolia intends to establish a telecommunications network which could contribute to life level improvement in the rural areas and the rural economic development. The rural telecommunications network development is an important theme of the country to be placed under the international assistance.

(3) Development Framework

This Master Plan is aimed to set up a framework, in quantitative and in recognising the actual situation, for the establishment of the future information network at the rural areas in Mongolia which will support the socio-economic development of the rural areas. To reduce imbalance of the telephone density and information and communications technology between the urban and rural areas, the Government of Mongolia intends to perform the development framework and strategies to digitalise and expand the existing telecommunications network in Sum centres to realise automatic dialling and to replace the aged equipment, including the transmission system between Aimag and Sum centres, and to introduce and expand the IP-based network to contribute the information welfare to the rural dwellers and to contribute to economic prosperity and a better quality of life.

This Master Plan Study covers long-term development for the telecommunications network up to 2020 in the whole Mongolia. The planning period up to 2020 is divided into several milestones as target years i.e., a short-term plan up to 2008, a medium-term plan up to

2013 and a long-term plan up to 2020. For the setting-up this Master Plan Study, the special attention is paid in the basic policy of MTSPS 2001, maximum use of the existing equipment, realistic and cost-effective works in Phase-I (up to 2008) period for the section of the priority project(s) among these works, and to review the works planned in Phases-II (up to 2013) and III (up to 2020) period in appropriate timing whether the plans are in line with the technical trend and innovation and conform with the demand of the area at the time.

(4) Key Development Targets

This Master Plan aims to increase the telephone line density of the fixed telephone services per 100 inhabitants in the whole country from 6.95 lines at present to 11.64 lines in the year 2020, and for the rural areas from 5.70 lines at present to 9.92 lines in the year 2020. For the Internet it aims to increase the subscriber density per 100 inhabitants in the whole country from 0.37 subscribers at present to 6.60 subscribers in the year 2020, and for the rural areas from 0.03 subscribers at present to 3.77 subscribers in the year 2020.

(5) Strategies of Network Expansion and Improvement

The network expansion and improvement in the rural areas up to the year 2020, including the service provision, will be established in the following policies, major objectives and manners:

- (a) To digitalise the telecommunications network in Sum centres, including the transmission system between Aimag centres and Sum centres, and to realise the distant direct dialling through small switching system or DLC at the major Sums in the Phase-I;
- (b) To realise 100% fulfilment of the demand forecast in major Sums centres in the Phase-I;
- (c) To introduce and extend the IP network to major Sums through digital trunk line, and to realise the distant direct dialling at all Sums on the IP network in the Phases-II and III;
- (d) To achieve the above objectives by the year 2020;
- (e) To design the proposed telecommunications network in consideration of the economy, easy operation and latest technologies; and
- (f) To attain an acceptable quality of services for the fixed telephone service and data communications for both national and international communications.

The detailed strategies for the network expansion and services provision in the rural

area, including the Internet services are as follows:

- (a) The PSTN and VoIP networks will be coexisted in the Phase-I. The demand fulfilment will be performed by the expansion of the PSTN network at the initial stage of the Phase-I, and the IP-based network will be introduced at the latter stage of the Phase-I, depending on the technical innovation and development of IP.
- (b) The expansion of the PSTN will be suspended at the end of the Phase-I. The expansion by the IP network will be realised and the existing PSTN will be retired in the Phases-II and III.
- (c) The automatic dial connection and the DLC and PBX will be realised at the major Sums in the Phase-I. The IP network at the major Sums will be realised through the gateway connection of the trunk line, and the automatic dialling at all Sums by the IP network will be realised in the Phases-II and III.
- (d) The automatic dial connection from the HF transceiver in Bag will become possible by adding the radio to phone patch interface equipment upon the digitalisation of transmission lines between Aimag centre and Sum centres in the Phase-I.
- (e) The Internet will be introduced in some Sums in the Phase-I. The high speed Internet will be introduced at some Sums in the Phases-II and III. The IT spot (PCs and printer for IT and Internet service such as the present Internet cafe are installed in MT office, including telephone and facsimile) will be established at all Sums.
- (f) The IT spot function, using the high speed Internet, etc., will be upgraded in the Phase-III

(6) Strategies of Fulfilment Plan

The strategies of the fulfilment plan of the fixed telephone demand in the rural areas are that during the Phase-I, 100 % of the fixed telephone demand in Sum centre will be fulfilled in the priority Sums of the major Aimag where much initial cost is not required. Accordingly the target fulfilment will be 50% in the earlier stage and 80% at the latter stage of the Phase-I, depending on the available funds. In order to realise the automatic dial connection from the HF transceiver in Bag it is recommended to add the radio to phone patch interface equipment in the HF radio transmission network upon the digitalisation of trunk lines between Aimag centre and Sum centres.

18.4 Analysis and Assessment of Master Plan

18.4.1 Social Appropriateness

(1) National Telephone Density

The forecasted fixed telephone density in the whole Mongolia under this Master Plan is 8.17 lines per 100 inhabitants in the year 2008, 9.38 in the year 2013 and 11.64 in the year 2020 respectively. Those results are almost the same as the telephone densities of the similar economic level countries, as they are forecasted based on the correlation between telephone density and GDP per Capita of the selected 43 countries in Asia.

(2) Improvement of Telephone Density Imbalance between Urban and Rural Areas

The forecasted fixed telephone density under the Master Plan per 100 inhabitants are 11.15 lines in Ulaanbaatar and 6.82 lines in the whole rural area in the year 2008, 12.46 and 7.96 in the year 2013 and 15.34 and 9.92 in the years 2020 respectively. The above stated imbalance in the level of telephone density would be inevitable due to the conditions in the rural areas as featured by the vast land, dispersed many small Sums, high investment cost and low profitability.

(3) Subscriber Direct Dialling

The subscriber direct dialling is planned to be realised in Sum centres where the demand is fulfilled with new telecommunications facilities. The demand fulfilment in the Sum centres across the country under this Master Plan is 81.8% in the year 2008, 95.7% in the year 2013 and 100% in the year 2020 respectively. Thus, subscriber direct dialling system covering all Sum centres is completed by the year 2020.

(4) Regulation Change and Privatisation in the Future

The policy of deregulation, privatisation and promotion of free competition including sale of MT shares through tendering, putting to lease of the state-owned backbone system to the operator, adoption of universal service obligations fund, etc., is by and large in line with the policy trend of the world. However, there are still many issues to be cleared and firmed up for the implementation of the policy. Concrete measures such as accumulation, disbursement and settlement of the universal service obligations fund to cover the capital investments and the operational losses of rural operators, the tariffs adjustment (increase in local call charges and lowering of interconnection charges in particular), etc. should be immediately decided

and implemented.

(5) Elimination of Digital Divide

The introduction of IT-spots at the same time with the digitalisation of rural network infrastructure is planned under the Master Plan in order to bridge the digital divide between the urban and the level of Sum centres. In order to establish an information-based society in which everyone can obtain the benefits of the ICT revolution and take advantages of the numerous opportunities it brings for the development and prosperity, it is recommended to take immediate steps to develop the necessary infrastructure that will provide access to such resources as the Internet.

(6) Improvement of Productivity and Efficiency of Industry in Rural Area

Telecommunications development can raise the productivity and efficiency of agriculture, industry, commerce (including international trade and tourism) and the social service, and enhance the quality of life in rural and remote areas.

(7) Contribution to Needs of Rural Economy

A substantial benefit that cannot be quantified could be realized in term of contribution to the needs of the rural economy including industrial development and natural disasters prevention.

(8) Contribution to Needs of Social and Human Development in Rural Areas

Another substantial benefit could be realized in terms of contribution to the social and human development needs in the rural areas, such as emergency service, medical and health care services, education, poverty alleviation, natural disasters prevention and other administrative services.

18.4.2 Technical Appropriateness

(1) Introduction of New Technologies and Services

The Master Plan is prepared for the eventual shift from the conventional telephone network to the IP-based network in support of the goal of promoting the development of new telecommunication technologies for rural use in Mongolia. The introduced plan is in line with

the world trend. The following basic requirements for telecommunications systems deployed in rural areas can be met:

- (a) Implementation and operation is possible at cost effective way in areas where population density is low;
- (b) The system can be easily installed, even in remote and inaccessible locations;
- (c) Centralized system operation and maintenance can be carried out even where qualified technical personnel are scarce; and
- (d) Implementation is possible even when basic infrastructure such as mains electricity, running water, paved roads networks, etc., are absent.

(2) Modernisation and Digitisation of Network

100% digitalisation of network will be made by the year 2020. Quality of service and the operation and maintenance for the network can be met on Sum centres' demand, and an equivalent service quality to the level of similar countries would be achieved. The network is modernized as at the level of similar countries. It will become possible to provide access to a wide variety of new service applications based on IP such as e-mail, e-commerce, tele-education, tele-health, and telemedicine in rural and remote areas

18.4.3 Economic Appropriateness

(1) General

EIRR is calculated and reviewed, taking in telephone users' "Saved Travel Costs" that are adopted as a supplementary factor of the economic benefits reflecting the results of household survey. As the country has a vast territory, "Saved Travel Costs" and the accompanying "Opportunity Costs" are substantial. The Consumer's Surplus is quite large for any one time of travel, if the travel is substituted by the use of telephone. However, due to the high costs, rural people only go to Ulaanbaatar and Aimag centres within limited number of times for a year, and "Saved Travel Costs" cannot constitute the major factor of the economic benefits.

(2) Economic Internal Rate of Return

Economic Internal Rate of Return (EIRR) that is a useful tool to clarify the magnitude of economic contribution of the Master Plan is calculated at 7.66% with the conditions that positive cash flow for a single year is realised in the 8th year and positive accumulated cash

flow in the 16th year. The value of EIRR amply exceeds the forecast of Mongolia's GDP growth rate of 4.97% for the medium growth case. The result of Economic Evaluation suggests that the implementation of the M/P facing the serious financial issues could be accomplished by a comprehensive development approach to be made jointly and harmoniously by the government, people and the relevant firms as the matter of total development of Mongolia.

(3) Consumer's Surplus

The Consumer's Surplus calculated under this Master Plan is an annual average of US\$ 4.9 million.

18.4.4 Financial Appropriateness

(1) Financial Internal Rate of Return on Investment

Financial Internal Rate of Return on Investment (FIRROI) that indicates viability of investment is 1.871% with the conditions that positive profit for a single year is realised in the 16th year and positive cash flow for a single year in the 9th year. Financial self-sufficiency can be fulfilled in the 21st year.

(2) Required Subsidies

The operating loss continues for 15 years and the required subsidies to cover the loss is in an annual average of US\$ 1.4 million for 14 years. The fundamental cause is the fact that the capital investment of 2,296 US dollars per telephone line that is accumulated over the project period (2004-2020) is required for the development of rural telecommunications system due to geographic and socio-economic features of Mongolia, while average annual revenues would be limited to 181 U.S. Dollars per telephone line. (For reference: The World Bank statistics publicised on 9 September 2002 as entitled "ICT at a glance - Mongolia" indicated that the annual average telecom revenue per line of the countries of less than US\$ 411 GNP was US\$ 199 in the year 2000.) The operating entity needs to resort to the Universal Service Obligations Fund (USOF) as the source of the subsidy, since the disbursements from the state budget and other sources appear to be very difficult. The current legislation of USOF cannot take care of the operating losses of rural service providers. Nonetheless, in our opinion, those subsidies can be realised in Mongolia, provided that the workable system of USOF is created as being studied by MOI. The current provisions of telecommunications law and regulations should be revised under the consensus of telecom

sector stakeholders, so that the operating losses may be covered in addition to the capital investment, following the customary practices of USOF of the world. Proper action of the Mongolian government for the revision of USOF is of vital importance.

(3) Financing

With the above FIRROI, the financing sources would be limited to the grants under ODA, the universal service obligations fund and the funds from the Mongolian Government including the privatisation proceeds.

18.4.5 Organisational and Management Appropriateness

(1) Efficiency of Operation and Maintenance

Currently the number of telephones per employees is 26.48 and it is planned to improve to about 110 in the year 2020 by introduction of automatic dialling, offices centralisation, etc. Standard efficiency level in Asian countries would be achieved during 20 years.

(2) Effective Organisation and Staff Allocation

The organisation has clear instruction and order system and job demarcation system and the staff allocation is well balanced in each division and section. Considering shortcomings in Mongolia such as a vast land and dispersed many small Sums, re-organisation and effective staff allocation are planned by centralisation and integration of offices, etc., in line with the framework of facilities plan. Details of the re-organisation and staff allocation plan are to be developed.

(3) Standardisation and Computerisation of Works

The standardisation of the operation and maintenance workflows and computerisation such as billing and collection, marketing, accounting, etc., are planned. The introduction of the standard workflows and MIS (Management Information System) are planned. The plan is in line with the world trend of management, but the details such as contents and time are to be developed.

18.4.6 Appropriateness for Environment Protection

The implementation of the Master Plan is based on designs for prevention and protection of the environment, especially for providing electricity of microwave transmission equipment in rural areas. Renewable energy technologies, such as solar photovoltaic, small wind-electric turbines, and micro-hydro systems offer environmental protection advantage.

18.5 Issues and Points of Attention for Implementation of Master Plan

As analysed and evaluated in the above, in order to implement practically and in time the Master Plan for telecommunications development in the whole rural areas of Mongolia, attentions should be carefully paid to the following:

(1) Creation of Effective Funding Mechanism of USOF

Financing sources for implementation of the Master Plan would be limited to grants under the ODA, the USOF (Universal Service Obligations Fund) and the funds from the Mongolian Government including the proceeds from the sale of the Government's shares of MT through privatisation procedures. Therefore, all available financial resources for investment should be explored and mobilised in realistic approach. Especially subsidies such as the USOF, etc., should be indispensable to give a fair competition opportunity to rural telecom operators for new investment and to make up operating losses for the first 15 years of operations under the Master Plan. At present, implementation of the Universal Service Obligations (USO) is behind schedule, therefore MOI needs to take a strong policy and leadership for the USO, making clear definition of services and areas by phase of the USO implementation and penalty in the event of breach. Also MOI needs to clarify the kinds, nature and amount of costs to be borne by the USOF, and to establish collection procedures and contribution calculation method of the USOF from the concerned telecom providers in a simple and clear regulation.

(2) Local Company

In order to clearly show the operations results of Aimag and Sum networks and utilisation of the USOF, separation and creation of local company(ies) covering Aimag and Sum network(s) from the existing MT should be considered.

(3) Adjustment of Tariffs

During the five years since 1997, in spite of inflation in Mongolia, tariffs have been almost unchanged except for an aggregate of 60% lowering in international call charge rate

denominated in US dollars. It may appear that the timing for the next revision of tariffs is already matured, in order to make sound investments for the development of rural telecom services. On the other hand, it should be considered to grant an incentive to rural users to help them enable to increasingly access the telecommunication system, for example; in further discounted tariffs from the regular ones for residential users within a capping of certain volume of telephone calls every month (with exception of unlimited discounted tariffs for hospitals, schools and other public service installations). CRC's report for the revision of tariffs is upcoming taking in the findings and recommendations of the studies made by the World Bank and foreign specialists, aiming at rebalancing of the respective tariffs reflecting own requirements of Mongolia.

(4) Privatisation

Currently the entire amount of lease rental collected from MT is not utilized for telecom development. Therefore an appropriate portion of the lease rental (net of those disbursed for debt servicing) and the proceeds of the sale of the Government's stocks of MT out of privatisation process should be used for rural telecom development.

(5) Backbone Transmission System

Although the Master Plan does not include backbone transmission systems, those are essential for the rural telecommunications development. Investment plans of backbone network of private companies, utilization rules among operators and tariffs of the existing backbone networks are not clearly regulated. Therefore, MOI, CRC and PTA should immediately establish a backbone investment plan, make a rule for efficient use and control of the backbone network. Investment funds for the country's telecom development have to be more or less dependent on ODA. Accordingly nationalisation or joint venture of the backbone systems is inevitable on a medium and long-term basis. In this connection another master plan study for development of backbone transmission systems and its implementation are required. The above-mentioned idea of joint venture should be studied under that master plan.

(6) Establishment of Comprehensive Rural Development Plan

The economic evaluation suggests that this Master Plan could be fulfilled by the comprehensive development approach under consensus of the Government, individuals and firms from the concerned sectors. In order to aim at the increased telecommunications revenues, there should be realised a comprehensive and synergistic development of agriculture and livestock farming industry, tourism and services industries in the rural areas.

As a driving force of rural telecommunications development, the Government in fostering environment for set-up and growth of the small and medium scale enterprises should promote utilization of the potentiality of private enterprises. Services of hospitals, schools and other public service installations should be upgraded by enhancing their facilities as well as staff capacity.

(7) Review of Master Plan

This Master Plan should be reviewed in the proper interval (preferably annually, at longest 3 - 5 years) in consideration of the recent speedy technical innovation of the telecommunications filed, the investment funding and the changes of the situations surrounding MOI and PTA

18.6 Conclusion

Applying the above method to the total achievement of this Master Plan, it has been proved that some high degree fulfilment of the respective targets can be realised as to the national base telephone density, introduction of new technologies and services; and the pending development issues in the rural telecommunications in eliminating telephone density gap and digital divide between urban and rural areas; and in the management and organisational improvements.

However, every effort of rural telecommunications development will have to face the country's geographic and demographic features that small Sums or settlements are scattered in its vast territory. In the implementation of the Master Plan, the formulation of long-range business plan in particular, low profitability in the rural areas would hinder the accomplishment of self-sufficiency of rural telecommunications operators, while their services would require a massive amount of capital investment. This problem would result in limiting the sources to finance such investment as well as the necessary working capital. The above operational and financial issues that are most critical for the rural telecommunications development in Mongolia should be overcome.

In addition to the above, there should be noted that substantial benefits that cannot be quantified could be realised in terms of contribution to the economy and social and human development needs, such as medical and health care services, poverty alleviation, education, prevention from natural disasters and other administrative services.

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