

Information Memorandum

Rehabilitation of the Telecommunications Sector In East Timor

August 2001

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PURPOSE OF THIS INFORMATION MEMORANDUM

This document has been prepared to assist commercial entities assess the investment opportunities in East Timor Telecommunications Sector with a view to providing those services throughout East Timor.

In addition this document provides the Information Technology, Postal and Telecommunications Division of the Infrastructure Department of the East Timor Transitional Authority (ETTA) with a confidential model as a means of assessing the proposals which various entities are likely to submit for the right to operate telecommunications in East Timor for a license period to be determined.

Executive Summary

This document provides an estimate of a number of demographic and economic factors which in turn lead to an estimate of the demand for telecommunications in East Timor. Normally, estimates are founded on sound, reliable information, giving those estimates some degree of confidence. This has not been possible for East Timor as few reliable basic statistics exist, and those that do, tend to be first-cut provisional estimates.

Despite the very considerable difficulty in deriving credible estimates of telecommunications demand, this has been attempted, using what data does exist and making assumptions based on experience elsewhere.

This was done by means of a spreadsheet model, utilising existing provisional data and many assumptions based on past experience, in the absence of more concrete information. It is possible to use this spreadsheet, changing all important assumptions as better information comes to hand, or more informed knowledge is applied.

Importance of Telecommunications

Telecommunications, being the nervous system of an economy, will continue to play a most vital role in the social and economic development of East Timor. It is essential that urgent measures are taken by the Government to establish telecommunications between Dili and the District Capitals as soon as possible and to progressively extend the network into the other larger towns and nearby rural areas. Due to large numbers of East Timorese living in Australia, Indonesia, Portugal and other places, international telecommunications are essential to maintain social cohesion between these dispersed families and communities.

Population

Use was made of statistics and estimates of the Bureau of Statistics of UNTAET in estimating the current population of Dili, the District Capitals and the Rural Areas. Taking into consideration past growth rates and possible rising incomes, combined with possible family planning projects for the future, future population growth estimates have been made.

Economic Activity

Tentative estimates of the sector components of the East Timor economy have been made by the IMF together with an estimate of the 1999 and 2000 levels of GDP. Assumptions were made on how this could be subdivided to the estimated GDP for Dili, District Capitals and Rural Areas. More assumptions were then made on the growth in the economy, hazardous as this may be in the absence of a duly elected Government with policies, priorities, known natural resources on which to build economic activity, and firmly identified sources of funds needed to rehabilitate and develop this new nation.

Prediction of Telephone Demand

Telephone demand predictions have been based on the world pattern of demand, utilising the high correlation between telephone density (telephones per 1,000 of population) and the GDP per Capita. This method has been found to estimate a conservative level of market demand, based, as it is, on statistics of telephone demand which has been met, rather than the true demand (latent and served) in many developing countries.

To undertake this estimate, the GDP per capita of East Timor was estimated, using the above GDP estimates together with the population estimates. Data published by the World Bank¹ for the year 1998 was analysed to determine a suitable algorithm for predicting demand for telephones. Using this information, demand for telephones has been estimated, well into the future, making such predictions highly questionable as to their level of reliability. However, to undertake investment in long term assets such as telecommunications, some longer term estimates must be made to enable planning over the longer term.

¹ "2000 Development Indicators" World Bank, Washington D.C. U.S.A.

To assist others to estimate revenues possible from telecommunications investments, an estimate of calling patterns has been made taking into consideration of daily usage of both business and residential services, and the dispersion of the traffic generated between various locations in East Timor and the world.

Estimates for Informatics

Using World Bank data on the density of mobile phones, computers and Internet hosts, the high correlation between demand for these services (in terms of density measured by items per capita) and GDP per Capita suggests that a first order estimate of the demand for these devices can be made. These estimates have been made as these in turn will place demands on the telecommunications network for capacity to serve their needs.

Range of Estimates

In addition to the base case estimates, both optimistic and pessimistic estimates of demand have been made.

East Timor

East Timor is the newest nation in the world. It comprises the Eastern portion of the island of Timor, between the approximate coordinates of 8° 19' South and 9°30' South, and 124° 55' East and 127° 22' East. In addition, there is an enclave of East Timor in the area surrounding the District Capital of Oecussi in that part of West Timor located approximately 9° 10' South to 9° 30' South and from 124° 05' East to 124° 29' East. Two islands, Atauro and Jaco, are part of East Timor and are located North and East of the Island of Timor respectively.

It is a small country approximately 265 Km in length and up to 92 Km wide situated about 500 Km north of Australia WNW of Darwin. It is a mountainous island with some peaks over 2,900 metres, subject to a tropical climate within the monsoon belt, with wet and dry seasons. It has four major river systems and receives 1200 to 1500 mm of rain annually during the three month monsoon season during December to March.

It currently has a population of about 780,000 people but over 100,000 refugees are known to be living in West Timor in refugee camps and more residing in Australia and Portugal. It is not known how many of these will eventually return or when. In recent years there has been considerable movement of the East Timorese population to and from Indonesia and other parts of the world.

East Timor has emerged very recently as an independent nation after centuries of being part of the territories of more powerful nations. From the 16th Century until 1975, it was a colony of Portugal. From 1975 until September 1999, it was absorbed forcibly as part of Indonesia.

The Transition to Nationhood

During 1999 in a plebiscite to determine the wishes of the people regarding their future, the people of East Timor overwhelmingly voted to become an independent nation. Following publication of this result, militia units cause very widespread destruction of infrastructure, including telecommunications assets. Much of the capital, Dili, and other District Capitals, were burnt. A very large number of homes, administrative and commercial buildings were destroyed and considerable amounts of infrastructure devastated, seriously constraining the present economy of this new nation.

Part of the destruction was to the telecommunications facilities in much of the country. This has been described in detail in the Communications Assessment Mission "Report on Communications Infrastructure, 6 February, 2000" commissioned by AusAID.

To assist East Timor establish itself, the United Nations Transitional Administration in East Timor (UNTAET) was created. This Administration was charged with undertaking the task of over-sighting the rehabilitation and initial development of the nation including the Information Technology, Postal and Telecommunications (ITPT) Sector.

Importance Of Telecommunications

There are no nations of the world pursuing economic and social development that are not doing so without the help of a substantial telecommunications infrastructure investment. Telecommunications can be thought of as the nervous system of the economy. Without it, the nation cannot achieve social and commercial cohesion both within and with the outside world. Experience in all developing countries has been that once telecommunications facilities are installed, they are immediately put to productive use, quite often at levels that far exceed any conservative estimates of demand and utilisation. Statistics for the world confirm this.

Information Services, especially telecommunications, is vitally important for the economic and social development of East Timor. The Internet is now making an important contribution to providing and distributing information throughout the world.

Prior to the wanton destruction of the previous telecommunications network infrastructure, East Timor enjoyed the use of a high quality telecommunications network, even though the majority of services were concentrated in the Capital, Dili with only a relatively few services in the District Capitals. This network had been incorporated into the Indonesian telecommunications network with access through satellite links to Jakarta and Denpasar and from there, to the rest of the world.

With the huge task of rebuilding the East Timor economy and social structure, telecommunications need be also rehabilitated urgently, to play its vital role in restoring East Timor as a thriving economy and society.

PROSPECTS FOR INFORMATION TECHNOLOGY AND TELECOMMUNICATIONS IN EAST TIMOR

It is now recognized that Telecommunications and Information Services are essential for every country. Studies by the ITU, the World Bank and others suggest that the level of demand for such services is related to two main factors;

1. Population Size
2. Economic activity as measured by GDP/Capita

There are many other factors peculiar to each country, but GDP/Capita and Telephone Density, measured as telephones connected per 1,000 of population have a high correlation, without inferring any causal relationship, and would suggest that GDP/Capita is useful in determining a conservative estimate of the telephone density needed in a country. Similar data for the density of mobile telephones, computers and Internet hosts versus GDP per Capita, also exists and exhibit very high correlation coefficients.

For East Timor, little in the way of reliable statistics exist, although for essential planning purposes, a number of estimates have been made. In the absence of better or more authoritative information, these estimates have been used to predict both population and economic growth and hence the demand for telecommunications.

DISCLAIMER

East Timor presents exceptional difficulty to the task of making forecasts of such important parameters such as the demand for telecommunications and the likely revenues so derived. The data needed to make such estimates are either not available or are very tentative estimates. Because some estimates of telecommunications demand are essential to plan the development of East Timor, the following work has been done using what sparse information is available and employing this consultant's past experience of working in developing countries on telecommunications projects over a number of years.

Anyone using the work of this report for commercial purposes should make his or her own assessment of the methodology used in this report and, most certainly, should make independent assessment of all critical assumptions for reasonableness. Particular attention should be paid to assumptions on likely population growth, distribution of GDP between areas within East Timor, the growth rates expected in the various sectors and regions of the economy, and expected telephone calling patterns with respect to traffic generated and call holding times.

POPULATION GROWTH

A report by the Research & Census Unit of the Bureau of Statistics, UNTAET² has estimated the population in the Districts of East Timor as being 779,568, but has heavily qualified these estimates with the following comments, as quoted:

- “The great Movements and displacement from East Timor population into West Timor and other islands in Indonesia, in sequence of militia terror in the Territory;
- The number of returnees to East Timor as the UNTAET starts to administer the Territory and the Indonesia militaries leave’s;
- The number of Indonesian citizens returning home as the Indonesia’s leave East Timor;
- The unknown number of deaths due to the violence and well the height level of mortality occur in Territory during these period;
- No availability of the natural and migrations components – fertility, mortality, international and internal migrations”

Nevertheless, for the sake of making some assessment of the future demand for Information Services, the estimate provided for the year 2000 population of 779,568 persons has been used as a base.

The future population forecasts are even more difficult to estimate because of the possible continuation of population movements in and out of East Timor, together with natural increases and likely family planning programs that will aim to reduce the population growth.

Forecasting the separate population growths of Dili, the Regional Capitals and the Rural Areas is more difficult again. The past population growth in District Capitals and the rural areas surrounding them is not known, and will, in the future, depend to a large extent upon future Government policies related to the geographic distribution and development of national infrastructure, (versus the centralisation of economic activity in Dili), policies related to health, education, defense and law and order, and the facilities and climate created for local and international investment. Despite the lack of such information, an estimate has been made, hazardous as this may be. It has ignored likely sudden increases in population due to the repatriation of refugees in West Timor and other places because the estimates made err on the side of conservative estimates of telephone demand. The return of refugees, while increasing the population and hence the likely longer term demand for telecommunications, may place considerable economic strains on the country in the short term, which may reduce the demand for telecommunications.

Past population growth has to be taken into consideration, even though future growth may be accelerated or limited by various interventions. From the data published, it is estimated that the population increased from 1980 to 1985 at a rate of 3.04% p.a., from 1985 to 1990 at a rate of 2.91% p.a. From 1990 to 1997, this rate decreased further to 2.25% p.a.

Past East Timor Population Growth			
1980	1985	1990	1997(est.)
558,000	648,000	748,000	874,000
	+3.04% p.a.	+2.91% p.a.	2.25%p.a.

Discussions with the Bureau of Statistics suggested that there is a reasonable possibility that in the short term, birth rates may increase slightly as life in East Timor resumes a degree of normalcy. Birth rates may possibly begin to decline slowly after about three years as the impact of a likely family planning program begins to take effect.

It is likely that Dili, being the main economic and Administrative Center, will grow at a faster pace than the rest of the country. Such a growth rate will be due to natural increases resulting from increased sense of security, increased affluence and to internal migration from the surrounding districts.

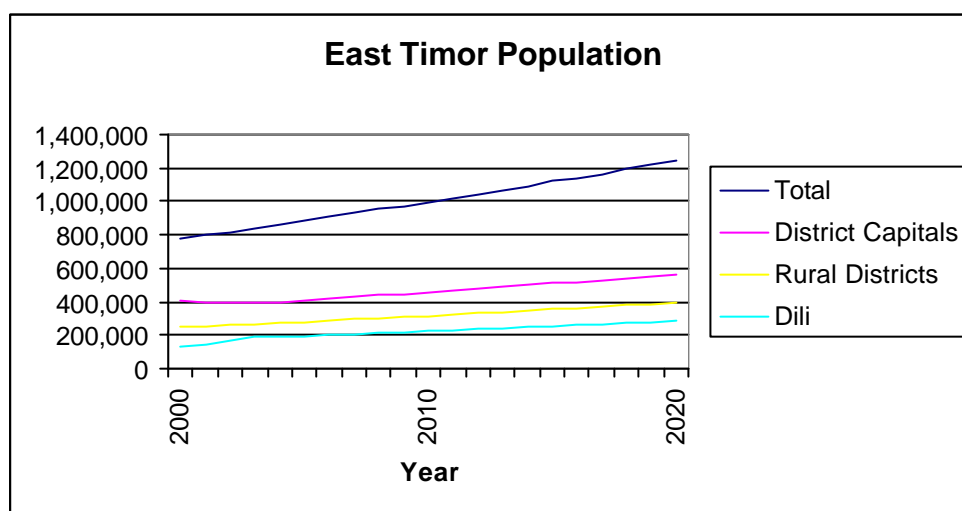
District Capitals may decline in population in the short term as people from these cities take up opportunities in Dili, but will then grow, but at a slower pace than Dili, as rising District economic and government administrative and service activity gets underway.

² “Estimation of Population by Sex and Age ; East Timor & Districts” United Nations Administration in East Timor (UNTAET), May 2000.

It is likely that the rural areas will continue to have a faster rate of population growth than in the cities and towns. It has been assumed that any family Planning Programs undertaken will have a lesser impact within the more conservative rural areas.

Such a scenario would suggest possible population increases indicated below.

Estimated Future East Timor Population						
Year	2000	2003	2005	2010	2015	2020
Dili	132,131	185,635	196,940	225,002	254,569	285,222
Annual Growth rates for previous period		12.00%	3.00%	2.70%	2.50%	2.30%
District Capitals	401,198	389,282	408,192	457,343	509,914	562,986
Annual Growth rates for previous period		-1.00%	2.40%	2.30%	2.20%	2.00%
Rural districts	246,239	267,508	281,050	316,434	354,537	393,360
Annual Growth rates for previous period		2.80%	2.50%	2.40%	2.30%	2.10%
East Timor	779,568	842,424	886,182	998,779	1,119,020	1,241,569
Annual Growth rates for previous period		2.62%	2.56%	2.42%	2.30%	2.16%



FORECAST OF ECONOMIC ACTIVITY

Making any forecasts of economic activity in a country such as East Timor that, as yet, has:

- no permanent Government,
- no known national policies,
- a badly destroyed private and public infrastructure,
- uncertainty about future revenues from the Timor Gap Oil
- and few known other economic resources to develop,

is an extremely difficult task. Any attempt to do this must be taken as only a very tentative estimate that must be subject to revision as better information becomes available.

Nevertheless, as in the case of estimates of population, some estimates must be made in order to determine the likely level of demand for Information services, in particular, those relating to telecommunications.

The Current and Future Outlook

The current economic circumstances of East Timor is dominated by the following

- The almost total destruction of a very large part of the natural infrastructure. This includes:
 - Almost all government and business buildings
 - Almost all telecommunications equipment with the exception of that in the Dili Telephone exchange and supposedly four transmission repeater sites. *Most Transmission towers at transmission repeater sites are undamaged and represent a significant set of valuable assets*
- The previous low level of East Timorese participation in government, administration, business and professions and the consequent concerns for the ability, in the short term, of East Timor people to undertake the roles required of them to lead and drive the development of their country
- The low taxation base, certainly in the near term, in relation to the huge task and cost of rehabilitating and revitalizing the nation
- The stimulating impact of the current United Nations presence on the service sector in and around Dili, and the anticipated negative impact of their departure expected in about two or three years
- The expectation, some time in the future (perhaps somewhere between 7 and 10 years hence) of economic benefits to the government of revenues from licenses to extract the oil in the Timor Gap, claimed by East Timor. This will require resolution of serious political issues concerning exiting international agreements on revenue sharing arrangements associated with this resource.

These considerations suggest that the following outlook may be reasonable to estimate of the future for the economy

Base Case Estimates

- **Next two to three years (2000 – 2003)**
 - The presence of the UNTAET will continue to stimulate the economy to near boom conditions, especially in the service sectors in Dili which caters for the UN and its personnel
 - Aid will assist the partial rehabilitation of the economy, especially through the reconstruction of the damaged physical assets, especially in Dili

Following two or three years (2003 – 2005)

- The anticipated departure of much of the UNTAET agency, maybe as late as 2003, will have a profound negative effect on the service sectors which has supported this agency and its staff
- Construction projects, supporting the presence of UNTAET, will cease resulting in a serious downturn in the building and civil works construction sector unless donor and multi-lateral aid moves quickly to fill the gap
- The exit of highly valuable experts and professionals, working within UNTAET but assisting local institutions, will curtail the effectiveness of many industries and institutions
- Law and order may decline without the presence of the UN Police keeping forces. Corruption may unfortunately also make a negative impact on the rate of economic growth.

Some time later between five and ten years (maybe!) 2005 – 2010

- East Timor will gain confidence in its ability to govern and develop its economy and society and will benefit from assistance rendered by donor countries and aid agencies who wish to see East Timor thrive as a peace loving, economically active independent nation
- Significant revenues may commence flowing to the Government of East Timor and to the communities close to where oil may be brought ashore and where a possible oil industry support centres could be located
- The initial impact of training and education programs will begin to have an effect on business and enabling coherent and sustainable economic development policies to be developed and implemented
- Attracted by the anticipated restoration and development of infrastructure, including telecommunications, and favourable environment for foreign investment created by the new Government, new industries are likely to be developed on a scale that should lead to import substitution and exports. These may include petroleum products, marble, sugar, coffee and cement and perhaps an old industry, sandalwood products. These industries may generate significant disposable incomes for those living within those centres in which these industries reside.

As can be seen, these are very subjective judgments but are shared by economists familiar with East Timor and those working within UNTAET and its supporting organizations. In the absence of better information, these assumptions have been factored into the estimates made in this report.

Optimistic and Pessimistic Estimates

Because of the uncertainty of the above assumptions, it is appropriate that some attempt is made to consider upper and lower limits of forecasts made. Such estimates are just as difficult due to the absence of sound and reliable data and known policies of Government. However, for the sake of determining a range of values the following assumptions have been made.

Pessimistic Assumptions

Next two to three years (2000 – 2003)

- While UNTAET is present in East Timor it will be unlikely that the economic activity currently observed will decline. This means that the near boom conditions will continue, but only until UNTAET leaves.
- A pessimistic assumption would be that UNTAET leaves at the end of 2001, and that the economy will decline severely due to very low levels of construction and a significant decline in the service industries.

- Business activity in other sectors will contract in size due to the combined effects of reduced market opportunities resulting from UNTAET's departure and lack of experience to exploit replacement and new markets
- Lack of
 - capable cadres of government administrators and
 - a functioning government data-base from which to collect taxation
 will restrict the government's ability to:
 - develop projects for economic development,
 - access funds for expansion of the Public Sector
 - create a climate favourable for foreign investment
- Aid Donors will become discouraged with the lack of progress being made and withdraw their previous levels of support.

Following two or three years (2003 – 2005)

- Most sectors of the economy will slip back to levels somewhere between 1999 and 2000, with major declines in the Construction and the Service Sectors.
- The severe economic conditions will impede the maintenance of law and order further limiting both local and foreign investment.

Some time later between five and ten years 2005 – 2010

- No benefits will accrue from the much hoped for Timor Gap oil revenues, limiting the Governments ability to kick-start the economy.
-
- The economy will grow mainly under the influence of population increase alone but with very few productivity gains derived from the general advance of technology on the world scene.
- Lack of progress will deter Aid Donors from committing to a country which fails to make progress from past assistance

This estimate is a most dismal one but one that must be considered because, while the probabilities for such outcomes are, hopefully, not high, the possibilities are real enough.

Optimistic Assumptions

Next two to three years (2000 – 2003)

- Conditions will develop that result in UNTAET staying until 2003. This will continue to stimulate the service sector and infrastructure
- Beyond that time, ETTA will continue to employ substantial numbers of expatriates to assist in filling those administrative and policy positions for which suitable local candidates are not yet available. These expatriates will contribute to much needed capacity building and continue to stimulate the service sector of the economy
- Assistance in the form of multilateral, bi-lateral and NGO aid will continue at a high level to rehabilitate the country and develop the capacity to increase the economy at a fast rate
- Foreign investment will be attracted at an early stage, creating employment opportunities and opportunities for many to participate in increased incomes and standards of living

Following two or three years (2004 – 2005)

- Although UNTAET may depart at the end of 2003, considerable numbers of expatriate staff will continue to live and work in East Timor, continuing to maintain the high level

of demand for services which have recently contributed significantly to economic activity in the Services Sector

- ETТА or its new equivalent will be able to attract aid and funds for the continued rehabilitation of infrastructure, maintaining a high level of activity in this sector
- The new Government will place a high priority on education and seek overseas assistance in the form of teachers and scholarships and work experience to generate the capacity within East Timor to take over the leadership and administration of government and business.
- Law and order will be maintained by a well-disciplined law enforcement agency, together with a civic awareness of the benefits of developing social and business ethics that are transparently honest and accountable.

Some time later between five and ten years 2005 – 2010

- Revenues from the Timor Gap Oil will flow soon after 2005 and from these, government will be able to invest and oversight the development of the social and economic infrastructure of the nation.
- District Capitals will receive special attention with public services being extended there with special emphasis on health and education
- Oil may be brought ashore in East Timor providing the opportunity for the development and export of petroleum products.
- Considerable investment in export-oriented industries will be established both in Dili and the rural districts. Cash generating projects for rural workers will be given priority

Existing Estimates

Some very preliminary work in estimating the past level of economic activity has been done by the IMF. In addition, they have made some very heavily qualified estimated projections for the years 2000 and 2001. It is likely that these estimates have taken into consideration the impact of UNTAET and other related agencies, and the return of people displaced during the turmoil following the independence plebiscite September 1999. The IMF have made an estimate that from the depressed state in 1999, the economy in 2000 may recover by as much as 15%, and by that margin again in 2001.

The IMF have also made a first order assessment of the components of GDP by Sector:

East Timor Real GDP by Sector % Distribution by Sector	
Agriculture	21.3
Mining & Quarrying	1.5
Manufacturing Industry	3.5
Electricity, Gas & Water	.7
Construction	23.2
Trade, Hotels & Restaurants	8.1
Transportation & Communications	8.1
Finance, rents & business services	4.6
Public Administration & defense	27.8
Private Services	1.2
Total	100.0

Because of the high correlation between Telecommunications Demand and GDP per Capita, it is useful to consider the level of economic activity in the regions where telecommunications demand occurs. This requires an assessment of the distribution of economic activity by sector and by region. Unfortunately, firm data for East Timor does not exist. However, a very approximate estimate of such a distribution has been

made by this consultant after examination of available data. It must be understood that while this estimate appears to be supported by other data, such an estimate is most hazardous and must be treated as a very rough approximation. As more precise data becomes available, it should be used.

The table below indicates the assumptions made in allocating economic activity between the regions:

Distribution of Economic Activity by Region			
Sector	Dili	District Capitals	Rural Areas
Agriculture	10.00%	10.00%	80.00%
Mining & Quarrying	0.00%	70.00%	30.00%
Manufacturing	50.00%	30.00%	20.00%
Electricity, gas, water	60.00%	40.00%	-
Construction	50.00%	50.00%	-
Trade & Restaurants	70.00%	30.00%	-
Transp. & Comms	60.00%	40.00%	-
Finance, rents etc	60.00%	40.00%	-
Public Admin	60.00%	40.00%	-
Private services	60.00%	10.00%	-

How fast the economy will grow is a vexing issue. Despite the low level of indigenous economic activity due to the:

- low level of literacy
- low level of education of the population
- low level of past participation in government and business by the East Timorese
- substantial destruction of physical assets following the independence plebiscite
- low level of available natural economic resources at present, other than people

it may be reasonable to assume that the economy will rebound in the initial period due to expected significant quantities of aid from abroad.

Based on this, it is likely that

- Dili will be the center of national economic recovery and development
- The new Government will become established here and as it takes control of law, order, public safety and other public services, it will generate significant economic activity in its own right
- Dili will be the center of private economic development as commercial enterprises take advantage of the infrastructure present in Dili
- It is likely that incomes will be substantially higher in Dili than elsewhere
- The airport and shipping port will contribute to the growth of Dili as the reconstruction and development process gets underway
- Foreign investment is likely to be centered on Dili, initially
- This will attract people to the Capital to exploit better economic opportunities

Hence Dili is likely to develop more rapidly in both population and economic terms.

In the District Capitals it is likely that:

- Initially, there will be a population decline as able people move to Dili to take advantage of better opportunities there
- Economic growth will be significant within a few years as rehabilitation of commercial infrastructure takes place and the Government re-establishes and extends its services to the districts
- Basic services such as police, health care, education, transport and communications will become established
- As Dili commercial business grows in size and activity they will extend to the District Capitals
- Population growth may not grow as fast as in Dili or the surrounding rural areas

In the rural areas, it is likely that ;

1. With the conservative rural population and anticipated future tranquility and gradual increase in incomes, the population will grow at rates similar to those in the more peaceful times before the turmoil following the independence plebiscite
2. Over time, family planning programs may slow the rate of birth
3. Productivity improvements are likely to be slow to achieve

These assumptions have been translated in a set of growth rates for the various sectors of the economy and can be summarized in the table below.

Growth rates (% p.a.) of GDP Sector Components for Dili (Base Case)						
	2000	2003	2005	2010	2015	2020
Sectors						
Agriculture	2%	2%	2%	2%	2%	2%
Mining & Quarrying	0%	0%	0%	0%	0%	0%
Manufacturing	20%	10%	7%	5%	4%	20%
Electricity, gas, water	18%	10%	7%	5%	4%	18%
Construction	15%	15%	7%	5%	4%	15%
Trade & Restaurants	12%	7%	4%	4%	3%	12%
Trans & Comms.	12%	6%	5%	4%	3%	12%
Finance, rents, etc.	15%	12%	8%	5%	5%	15%
Public Admin	13%	8%	3%	3%	3%	13%
Private Services	10%	8%	7%	6%	5%	10%

Growth rates (% p.a.) of GDP Sector Components for District Capitals						
	2000	2003	2005	2010	2015	2020
Sectors						
Agriculture	2%	2%	2%	2%	2%	2%
Mining & Quarrying	20%	5%	4%	4%	4%	20%
Manufacturing	15%	8%	7%	6%	5%	15%
Electricity, gas, water	50%	40%	10%	8%	6%	50%
Construction	40%	30%	12%	8%	6%	40%
Trade & Restaurants	30%	20%	10%	6%	3%	30%
Trans & Comms	35%	20%	10%	5%	4%	35%
Finance, rents, etc.	25%	30%	10%	8%	5%	25%
Public Admin	15%	15%	5%	3%	3%	15%
Private Services	20%	20%	20%	10%	6%	20%

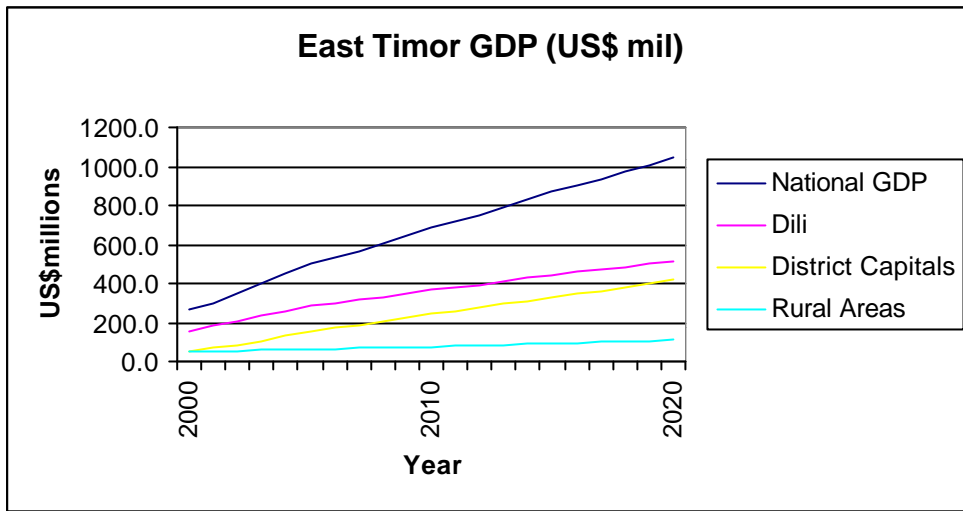
Growth rates (% p.a.) of GDP Sector Components for Rural Areas						
	2000	2003	2005	2010	2015	2020
Agriculture	3.5%	3.0%	3.0%	2.7%	2.7%	3.5%
Mining & Quarrying	50.0%	20.0%	20.0%	10.0%	6.0%	50.0%
Manufacturing	8.0%	5.0%	5.0%	3.0%	2.5%	8.0%

Based on these assumed growth rates, the following estimates of the size of the economy follows

Estimated GDP (US\$ million) (Base Case)						
	2000	2003	2005	2010	2015	2020
Dili	158.9	232.8	282.9	365.0	448.4	530.6
District Capitals	53.4	105.8	155.7	244.6	333.5	420.8
Rural Districts	50.6	59.1	64.3	82.5	101.0	119.9
National Total	263.0	397.7	502.9	692.1	882.9	1,071.4

These assumptions result in the following estimates of GDP/Capita:

Estimated GDP/Capita (US\$) (Base Case)						
	2000	2003	2005	2010	2015	2020
Dili	\$1,203	\$1,254	\$1,437	\$1,622	\$1,761	\$1,860
District Capitals	\$133	\$272	\$381	\$535	\$654	\$748
Rural Districts	\$206	\$221	\$229	\$261	\$288	\$305
National Average	\$337	\$472	\$568	\$693	\$791	\$863



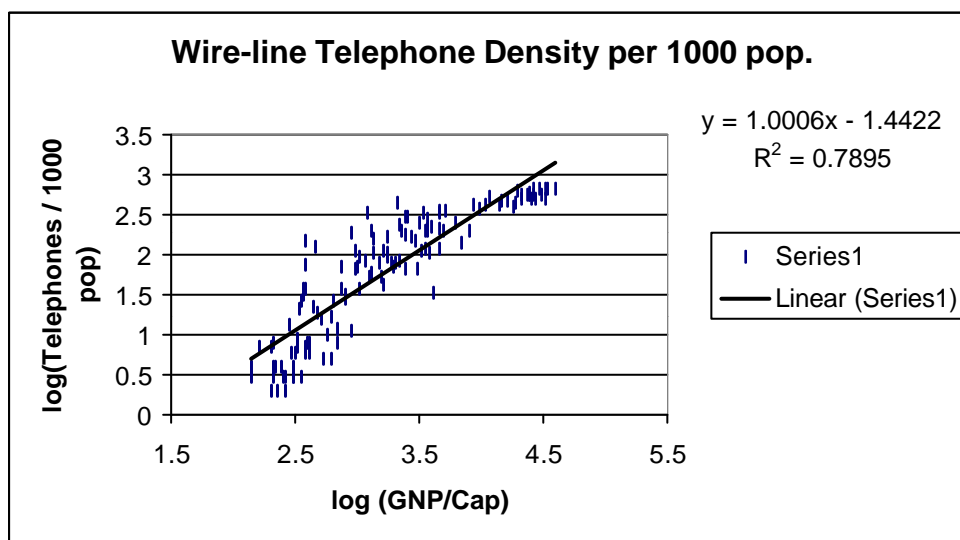
ESTIMATES OF WIRE-LINE TELEPHONE DEMAND

Using data collected by the World Bank and the ITU it is possible to predict the likely demand for telephones in East Timor based on similar levels of telephone density and economic activity in other countries. It is now known that during the pre-turmoil period, installation of telecommunications equipment and plant was installed and being installed in quantities adequate to address the challenge of meeting immediate and medium term demand. In Dili, an exchange was installed with a capability of ultimately connecting 15,000 customers, well in excess of the 4,800 local customers connected. It is not known why actual connections were not higher. Some of the equipment installation projects in other areas were not able to be completed and cut over into active service before the turmoil of 1999.

In 1998, in Dili and the District Capitals there were 6752 phones connected, 1,952 being located in the District Capitals. The sum of the populations in Dili and the District Capitals was 533,329 generating a telephone density of 12.7 phones per 1,000 population in those areas. Taking the estimated total 1998 population of 888,000 into consideration, the telephone density amounted to 7.7 phones per 1,000 population. The GDP/Cap for East Timor as a whole was then about US\$ 424.00. The telephone penetration would appear to have been low then in comparison with other countries at similar levels of economic development as the table below indicates.

Wire-line Telephone density (1998) comparisons ³		
Country	GNP / Cap (US \$)	Telephones / 1000 pop
Armenia	460	157
Azerbaijan	480	89
India	440	22
East Timor	424	7.7

The following Scatter Diagram of the apparent relationship between GNP/Capita and Telephone Density of Telephones / 1000 population. This has been derived from World Bank statistics⁴



There is a high correlation between these two parameters. The correlation factor is 88.9% indicating that it is useful as a guide to predict Telephone density from GNP per Capita using the algorithm

$$\text{Log}_{10}(\text{Telephone Demand} / 1000 \text{ population}) = -1.442 + 1.001 \times \text{log}_{10}(\text{GNP/Cap})$$

³ "2000 World Development Indicators", Tables 1.1 "The Size of the Economy" and Table 5.10 "Power & Communications", World Bank, Washington D.C., U.S.A.

⁴ "2000 World Development Indicators" Tables 1.1 "The Size of the Economy" and Table 5.10 "Power & Communications", World Bank, Washington D.C., USA

It should be noted that the above diagram is logarithmic/logarithmic and there are wide variations about the line of best fit.

It also should be noted that this scatter diagram indicates the met demand in various countries with varying GDP per Capita. It does not indicate the total demand. The real total demand for telecommunications is likely to be much higher than the plotted data, especially for the countries with lower GDP per capita. In these countries, competition for development resources may limit the ability to meet telecommunications demand in its entirety. It is known that waiting lists occur in many developing countries. Hence, using this information to estimate demand for another country is most likely to result in a conservative estimate.

It has been assumed that GDP and GNP are of a similar order of magnitude and can be used interchangeably. The difference between GDP and GNP is that the latter includes the net income earned by factors of production owned locally but located elsewhere in the world by a country's residents, less payments of factor income to the rest of the world for factors of production in East Timor owned by those living elsewhere. In view of the likely low level of East Timor investment elsewhere in the world and the low level of foreign investment in East Timor, this assumption would seem sound.

In 1998, it was estimated that the GDP per Capita was US\$424.00, falling to an estimated US\$304 in 1999 as a result of the turmoil and destruction, recovering to an estimated US\$337 in 2000. As the 1998 figure represented a period of relative political tranquility and economic development, it is reasonable to consider that this may be regained in the near future when the infrastructure of the nation has been rehabilitated. In fact, the unofficial estimates of the IMF indicate that the increase in GDP for the years 2000 and 2001 can be expected to be about 15% each year. Using the above algorithm for the 1998 GNP of US\$424.00, the algorithm suggests a telephone density of 15.4 telephones per 1000 population (+ or – a substantial margin) may be appropriate as an estimate of the real needs of East Timor. This compares with the achieved penetration of 7.2 phones per 1000 population in 1998. (6,392 connections and a population of 888,000). It will take some time for the economy to recover to 1998 levels. In the meantime, the forecast of the real demand of 12.2 telephones per 1,000 population has been made for the year 2000. (Indonesia had, in 1998, a telephone main line density of 27 lines per 1000 population with a GDP/Cap of US\$ 602.00).

It should be noted that it is usual to predict telephone density for the country as a whole. However, in order to get some appreciation of the relative demand for telephones in the various regions within East Timor, the same method of calculation has been used.

Currently there is no telephone service in either the District Capitals (other than for UNTAET personnel) or in the Rural Areas. In fact, no service has ever been provided in the Rural Areas. Nevertheless, experience elsewhere in the world indicates that if service were available, there would be a demand for service at approximately the levels indicated.

An inspection was made of some of the District Capitals and the surrounding countryside. It was evident that there exists a burgeoning economy, albeit starting from a very low base. This included the rehabilitation of previous homes, businesses and enterprises. What also was evident was the lack of telecommunications supporting these previous businesses, suggesting that there will be considerable opportunity to meet latent demand for telecommunications when they become available in suitable quantities.

It is most likely that future economic growth would require provision of service in line with other countries, suggesting that the following estimates of telephone penetration are appropriate. This translated into the following wire-line telephone density (telephones per 1000 of population):

Estimated Wire-line telephone density (Tels/1000 pop'n) (Base case)						
	2000	2003	2005	2010	2015	2020
Dili	43.6	45.5	52.1	58.9	63.9	67.5
District Capitals	4.8	9.8	13.8	19.4	23.7	27.1
Rural Districts	7.5	8.0	8.3	9.5	10.4	11.0
National Average	12.2	17.1	20.6	25.1	28.7	31.3

Applying this to the population estimates results in the following estimated demand for wire-line telephones in each of the regions considered:

Potential Telephone demand (Base Case)						
	2000	2003	2005	2010	2015	2020
Dili	5,767	8,447	10,266	16,038	20,721	25,392
District Capitals	1,935	3,834	5,644	8,871	12,094	15,334
Rural Districts	1,835	2,142	2,331	2,991	3,662	4,440
Total	9,538	14,424	18,242	27,900	36,477	45,166

It should be noted that this is the forecast potential demand for these regions and does not infer that connections will actually take place at the time of the demand arising. This is especially true for the Rural Districts that will have a high cost of network connection due to the mountainous terrain and large distances from the actual network of many potential customers. It is likely that such customers will be connected over a period of time as the network grows and makes the marginal connections feasible.

Pessimistic Estimate of Demand

Outlined above are a number of assumptions relating to a pessimistic future for East Timor, in terms of economic growth. The translation of these assumptions can be presented in the following tables:

Growth rates (% p.a.) of GDP Sector Components for Dili (Pessimistic)						
	2000	2003	2005	2010	2015	2020
Sectors						
Agriculture		2%	2%	0%	0%	0%
Mining & Quarrying		0%	0%	0%	0%	0%
Manufacturing		7%	-5%	3%	3%	3%
Electricity, gas, water		10%	-2%	5%	5%	5%
Construction		8%	-15%	4%	4%	4%
Trade & Restaurants		7%	-8%	2%	2%	2%
Trans & Comms		6%	3%	3%	3%	3%
Finance, rents, etc.		10%	-6%	3%	3%	3%
Public Admin		10%	2%	3%	3%	3%
Private Services		5%	-5%	3%	3%	3%

Growth rates (% p.a.) of GDP Sector Components for District Capitals (Pessimistic)						
	2000	2003	2005	2010	2015	2020
Sectors						
Agriculture		2%	2%	0%	0%	0%
Mining & Quarrying		5%	0%	0%	0%	0%
Manufacturing		5%	-1%	3%	3%	3%
Electricity, gas, water		12%	2%	5%	5%	5%
Construction		8%	15%	4%	4%	4%
Trade & Restaurants		4%	-5%	2%	2%	2%
Trans & Comms		6%	0%	3%	3%	3%
Finance, rents, etc.		10%	-3%	3%	3%	3%
Public Admin		2%	0%	3%	3%	3%
Private Services		2%	0%	2%	2%	2%

Growth rates (% p.a.) of GDP Sector Components for Rural Areas						
	2000	2003	2005	2010	2015	2020
Agriculture		3.0%	2.8%	2.7%	2.6%	2.5%
Mining & Quarrying		12.0%	-10.0%	2.0%	3.0%	2.0%
Manufacturing		4.0%	-2.0%	2.0%	3.0%	2.5%

Applying these growth factors to each sector, and taking into consideration the population estimates, the following assessment of GDP/Capita results:

Estimated GDP / Cap (US\$) (Pessimistic)						
	2000	2003	2005	2010	2015	2020
Dili	\$1,203	\$1,036	\$869	\$885	\$912	\$950
District Capitals	\$133	\$159	\$140	\$142	\$146	\$151
Rural Districts	\$206	\$208	\$208	\$210	\$213	\$217
National Average	\$337	\$472	\$568	\$693	\$791	\$863

This translates via the algorithm into the following demand for wire-line telephones, taking into consideration increases in population:

Potential Telephone Demand in each location (Pessimistic)						
	2000	2003	2005	2010	2015	2020
Dili	5,767	7,347	6,688	7,800	9,107	10,535
District Capitals	1,935	2,243	2,403	2,768	3,199	3,711
Rural Districts	1,835	2,021	2,114	2,410	2,743	3,102
National Total	9,538	11,611	11,205	12,978	15,049	17,348

Optimistic Estimate of Demand

Based upon the optimistic assumptions the following growth rates for economic sectors were made:

Growth rates (% p.a.) of GDP Sector Components for Dili (Optimistic)						
	2000	2003	2005	2010	2015	2020
Sectors						
Agriculture		2%	2%	2%	2%	2%
Mining & Quarrying		0%	0%	0%	0%	0%
Manufacturing		22%	10%	8%	7%	5%
Electricity, gas, water		30%	10%	8%	5%	5%
Construction		30%	15%	15%	10%	8%
Trade & Restaurants		20%	12%	5%	5%	4%
Trans & Comms		20%	10%	7%	6%	5%
Finance, rents, etc.		20%	15%	10%	10%	7%
Public Admin		15%	8%	3%	3%	3%
Private Services		15%	10%	8%	8%	8%

Growth rates (% p.a.) of GDP Sector Components for District Capitals (Optimistic)						
	2000	2003	2005	2010	2015	2020
Sectors						
Agriculture		2%	2%	2%	2%	2%
Mining & Quarrying		50%	10%	6%	6%	5%
Manufacturing		20%	10%	10%	7%	6%
Electricity, gas, water		60%	45%	12%	10%	7%
Construction		45%	35%	15%	10%	7%
Trade & Restaurants		35%	25%	12%	8%	5%
Trans & Comms		40%	25%	12%	10%	8%
Finance, rents, etc.		30%	35%	12%	10%	8%
Public Admin		17%	15%	7%	4%	5%
Private Services		25%	25%	20%	15%	10%

Growth rates (% p.a.) of GDP Sector Components for Rural Areas (Optimistic)						
	2000	2003	2005	2010	2015	2020
Agriculture		34.0%	3.5%	3.2%	3.0%	3.0%
Mining & Quarrying		50.0%	25.0%	20.0%	10.0%	8.0%
Manufacturing		10.0%	6.0%	6.0%	4.0%	3.0%

Utilising the methodologies used above, the following GDP/Capita estimates result:

Estimated GDP / Cap (US\$) (Optimistic)⁵						
	2000	2003	2005	2010	2015	2020
Dili	\$1,203	\$1,530	\$1,799	\$2,479	\$3,179	\$3,874
District Capitals	\$133	\$309	\$458	\$715	\$976	\$1,227
Rural Districts	\$206	\$224	\$236	\$273	\$306	\$336
National Average	\$337	\$551	\$686	\$972	\$1,268	\$1,553

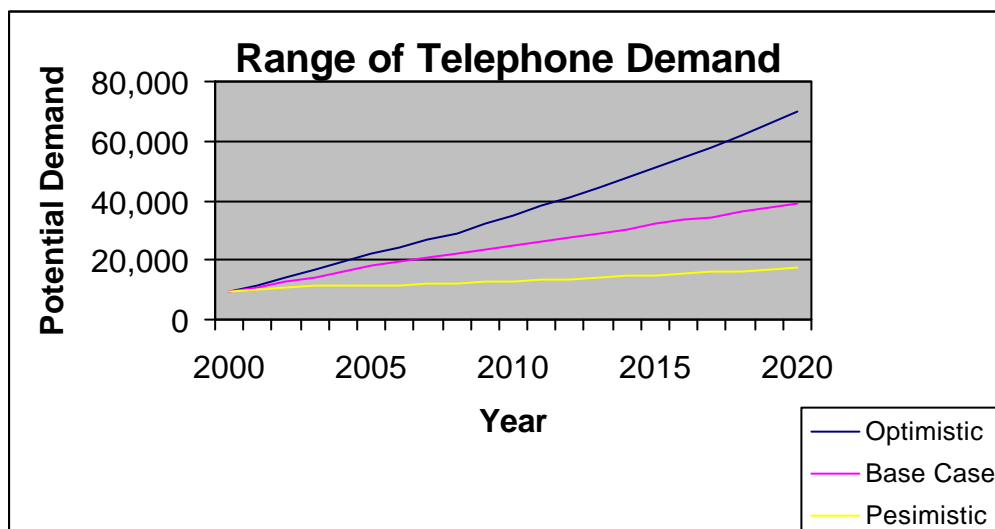
This translates via the algorithm into the following demand for wire-line telephones

Potential Telephone Demand in each location (Optimistic)						
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⁵ Using the formula $\text{Log}_{10}(\text{Telephones} / 100 \text{ Capita}) = A + B \text{Log}_{10}(\text{GDP} / \text{Capita})$
 where $A = 1.001$
 and $B = -1.442$

	2000	2003	2005	2010	2015	2020
Dili	5,767	10,308	12,859	20,245	29,364	40,114
District Capitals	1,935	4,356	6,781	11,860	18,060	25,054
Rural Districts	1,835	2,175	2,406	3,131	3,892	4,793
National Total	9,538	16,838	22,046	35,236	51,316	69,962

It can be seen that there is a considerable range of values between the pessimistic and optimistic estimates. Wide as these ranges are, they illustrate the difficulty in arriving at an estimate for which there is some firm degree of confidence



THE TELECOMMUNICATIONS MARKET

The world has entered the Information Age and the Global Market. International inter-connectivity has included all nations within this concept. This has been accelerated by lower tariffs for world trade bringing markets closer together and an emphasis on gaining access to information which enhances business opportunities and life in general. The "Just In Time" concept has also demanded better and faster communications between nations. The telecommunications market has expanded considerably to meet these new demands.

The market now comprises not only traditional facilities such as the telephone, but also advanced facilities supplied by⁶:

- Customer Premise Equipment
 - Point of sale Terminals, Automatic Teller Machines
 - Call Centres, Voice message Retrieval, etc.
 - Mainframe computers, LAN's, WAN's etc.

It is anticipated that, in East Timor, the supply of Customer Premise equipment will be from an open market with the main operator participating in this market. It should be a requirement that all telecommunications equipment sold should be certified that it conforms with technical standards set by countries with an ability to test and assess the safety, utility and conformity with internationally acceptable standards suitable for conditions in East Timor. It is unlikely that East Timor in the near future will be unable to establish a technical testing regime for such equipment. Hence the Government should appoint its Ministry to decide which standards, used by other countries, should apply to East Timor, and appoint it to issue permits to connect Customer Premise Equipment that meets those standards to the network.
- The Customer Access Network
 - Wireless Local Loop
 - Fibre Optic Cables
 - Short Hall Microwave systems
 - Various Data Transport Media
- The Switching Platform
 - V5.1
 - V5.2
 - n x 64 Kbits/s
 - 2 Mbits/s
 - International Gateway Exchange
 - Internet Node
 - Broadband Node
 - Cellular Mobile Node
 - Signal Transfer Point
- The Transmission Medium
 - Satellite
 - Ring Microwave (STM1 or STM4) + Spurs
 - Fibre Optics, etc

The telecommunications network in East Timor must address and meet the latent demand for traditional and, over time, advanced telecommunications services in both Dili and the Districts. This demand will include:

- Analogue lines
- ISDN (BA & PRA)
- Advanced Digital Subscriber Services (ADSS)
- GeoCentrex
- Internet
- Intelligent Network Services
- Broadband services

With a Ring Microwave system serving the Districts it will be practical and economic to deliver Direct Distribution of TV with capacity for local collection of TV and radio items for retransmission over this system.

⁶Data supplied by Mr. Pedro Braga, Director, Information Technology, Posts and Telecommunications Division, Infrastructure Department, ETТА.

Of major importance will be the necessity to provide appropriate world-class service to the soon-to-be-functioning Government of East Timor that will be addressing the needs of those living and conducting business outside of the Capital, Dili. These people currently have no telephone service. Each District Capital must be supplied with the level of service required by Government, business and the communities appropriate to each District.

Importance of Telecommunications for Social Cohesion and Development

Basic telecommunications, in the form of a wire-line phone service, is essential for both economic development and social cohesion and development. Telecommunications can play a vital role where communities have been dispersed due to disturbances of various kinds. Economic turmoil such as has been evident in East Timor splits families and communities. Even desirable education can encourage younger people to leave home to seek better employment opportunities away from family. Telephones can help such families stay in touch.

Business Usage

Telecommunications is an essential tool of business and commerce at nearly all levels of activity. It is certainly a much cheaper alternative in both time and money to the activity of traveling to deliver a message. It enables the user to remain at his work location while sending and receiving messages and other business information with minimum cost.

Public Payphones.

These are essential devices for those unable to afford a private connection to the network. Experience in India and other countries indicates that reselling telephone services can be a profitable business for small business entrepreneurs especially when combined with public service offerings utilizing a fax machine and a Personal Computer. These "Telecentres" can provide a much needed service in cities and towns. Another facility that has proven to be of considerable popularity in developing countries is the provision of public phones that utilize a pre-paid phone card. Card phones have proven to be successful in reducing the amount of vandalism associated with attempts to rob the call phone of coins. Vandalism can also be reduced by locating pay phones within the premises of shops known to stay open for extended periods.

From the above, it can be seen that there will be a demand for both business and residential services, together with public telephones for those who cannot afford a private connection but have the capacity to pay for the use of a public phone.

"Social" Category of Telephone Customers

Under the previous Administration in East Timor a special category of telephone customers existed as "Social" Telephone Customers. These were customers who operated as non-profit organizations or organizations classified as operating in the public good. As such, they paid less for new connections and for monthly service fees. This raises a very important matter of policy on the issue of subsidies.

There is no doubt that there are many noble institutions working in the public good or for various disadvantaged groups. As most of these operate on a non-profit basis it is appropriate to consider public support for these organizations. If the Government chooses to support them, then they should be supported by the community as a whole, and not by just certain sectors. Support should come from Government coffers that in turn should be supported by taxes. Hence, if these "social" organizations require support, the Government must decide what level of support is required. It is not the responsibility of telephone users to support such institutions but the community at large. Hence funds from taxpayers in general should be used, not those from telephone users.

Providing cross subsidies within the telecommunications sector for "social" customers distorts the cost of the work they provide and encourages excessive use of the telecommunications resources. In most developed countries, the concept of removing unnecessary cross-subsidies has been adopted by telecommunications Regulators. The burden of supporting charitable organizations has now been undertaken by Governments, determining policies of support for such organizations through other more direct means. It is strongly recommended that East Timor consider supporting benevolent institutions from grants from Government Revenues rather than selecting certain members of the community, such as telephone users, to deliver such subsidies.

EMERGING MARKETS FOR NEW TELECOMMUNICATIONS AND INFORMATICS

Throughout the world there is a phenomenon of a rapidly growing demand for very modern telecommunications devices and informatics. This includes mobile phones, computers, Internet access to the World Wide Web, with its associated email service. Many new services are being built upon these new devices. "e-Commerce is now a world phenomenon, growing steadily, albeit from a small base. Developing countries, no less than developed countries, are scrambling to meet the huge demand for these new services and to take advantage of the proliferation of services to education, health, government, commerce and entertainment that these services deliver.

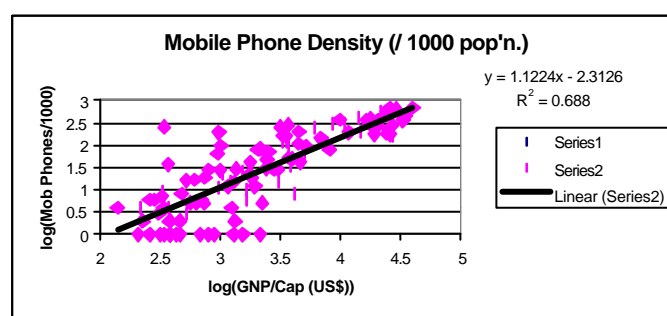
East Timor will need to take advantage of those services which speed the social and economic development of this fledgling nation.

Mobile Phones

There has been an explosive growth in the demand for mobile phones throughout the world. East Timor has been part of this trend to utilize the convenience of interconnectedness for peripatetic workers. Prior to the independence plebiscite two mobile phone systems operated on East Timor, one, an AMPS analogue system, and the other a digital GSM system. The cells were switched via satellite to an exchange in Denpasar, Bali. There were approximately 1,000 mobile services in Dili prior to the turmoil in 1999, but this has thought to have increased to a much higher level since the arrival of UNTAET. No services had been provided outside of Dili. All the equipment associated with this service was destroyed following the plebiscite.

Since the arrival of the International Force East Timor (INTERFET), Telstra has operated a digital GSM mobile phone system. There are approximately 12,500 mobile phones connected to this system, a large proportion being UN and NGO personnel. However, it is noticeable that many local East Timorese are subscribing to this service and using mobile phones in a number of enterprising ways.

The future for mobile phones would appear to be bright. The following graph indicates the distribution of mobile phones throughout the world based on GNP/Capita⁷.



From this data one can conclude that East Timor is likely to have a demand for mobile phones related to its achieved GDP/capita.⁸

⁷ Taken from data supplies in "2000 World development Indicators" Tables 1.1 "The Size of the Economy, and Table 5.11 " The Information Age", The World Bank, Washington. D.C., U.S.A.

⁸ Calculated using the derived curve of best fit formula :

$$\log_{10}(\text{Mobiles}/1000 \text{ population})=a + b \times \log_{10}(\text{GDP}/\text{Cap})$$

$$\text{where } a = -2.313$$

$$b = 1.122$$

Mobile Telephone Demand: East Timor						
	2000	2003	2005	2010	2015	2020
Total population	779,568	842,424	886,182	998,779	1,119,020	1,241,569
Total GDP/Cap	\$337	\$472	\$568	\$693	\$791	\$863
Forecast Mobile Demand (/1000 pop)	3.35	4.88	6.00	7.42	8.52	9.61
Total Mobile Demand	2,610	4,112	5,319	7,501	9,756	11,927

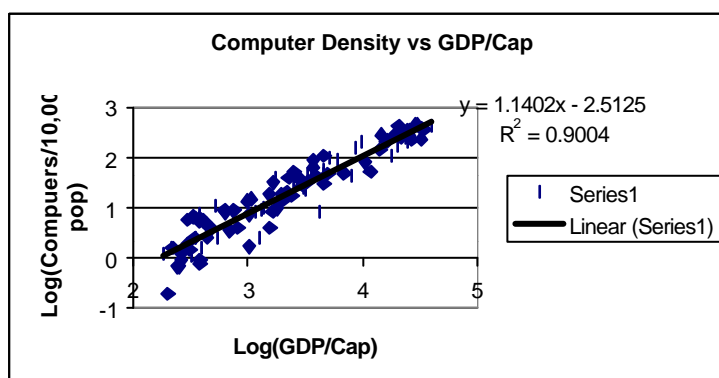
These estimates of demand are based on statistics applicable to 1998. Since then there has been an explosive growth in the demand for mobile phones as the perception of the benefits of this facility (both utilitarian and fashion-wise) have been recognized, especially by those whose occupations are very peripatetic. The technology continues to augment the range of service offered by these mobile devices making them increasingly attractive to more and more of the population. It is likely that the curve of best fit has moved upwards, increasing the current and forecast levels of demand by a significant margin. However, these conservative estimates have been used as a lower estimate of demand.

It is worth noting that mobile phones may be a more expensive solution to communications than fixed wire-line services, but their perceived utility have created a huge demand and have made them a complementary service to the fixed wire-line service. It is likely that the cost of mobile services may decline with time. So far, no country has the mobile service displaced the fixed wire-line service. In countries with a relatively low level of disposable income, economic considerations will emphasise the need for a wire-line service, but supported by a vigorously marketed mobile service.

Computers

Computers are the tools of modern-day government, business, professions and increasingly education. Among the affluent, they are also become household commodities for utilitarian and entertainment purposes.

All countries are using computers as the graph⁹ below shows. It again suggests that the density of computers within the population is related to the GDP per Capita.



As can be seen, there is a very strong correlation of 82.9% between these two factors. Taking into consideration the estimated future economic activity for East Timor, the curve of best fit, based on the somewhat dated data for 1998, suggests that the demand for computers in the table below, is applicable for East Timor¹⁰:

⁹ Taken from data supplies in "2000 World development Indicators" Tables 1.1 "The Size of the Economy, and Table 5.11 " The Information Age", The World Bank, Washington. D.C., U.S.A.

¹⁰ Calculated using the derived curve of best fit formula :

$$\log_{10}(\text{Computers}/1000 \text{ population}) = a + b \times \log_{10}(\text{GDP}/\text{Cap})$$

where $a = -2.513$

As it is unlikely that there are severe supply restraints on computers, the scatter diagram could be said to indicate the actual level of met demand for computers with varying levels of GDP/capita. This may be very different from the case of telecommunications where supply may be limited by Government policy on resource allocation, access to foreign funds and access to the skilled personnel required in a telecommunications entity.

If this can be accepted, then the following indicates a likely demand for computers in East Timor:

Estimated Demand for Computers by location						
	2000	2003	2005	2010	2015	2020
Dili	1,320	1,944	2,408	3,160	3,928	4,684
District Centres	326	713	1,100	1,813	2,542	3,269
Rural Areas	328	387	423	553	686	821
Total Computers	1,974	3,044	3,932	5,526	7,156	8,773

It is likely that private Internet Service Providers will establish the Internet in East Timor very quickly. As this happens it is likely that somewhere between 30% and 50% of all computers will be connected to the Internet or an Intranet. This will place real demands on the Telecommunications Service provider.

East Timor will of necessity require a robust informatics industry together with supporting complementary industries, to support such a demand. Of current concern are:

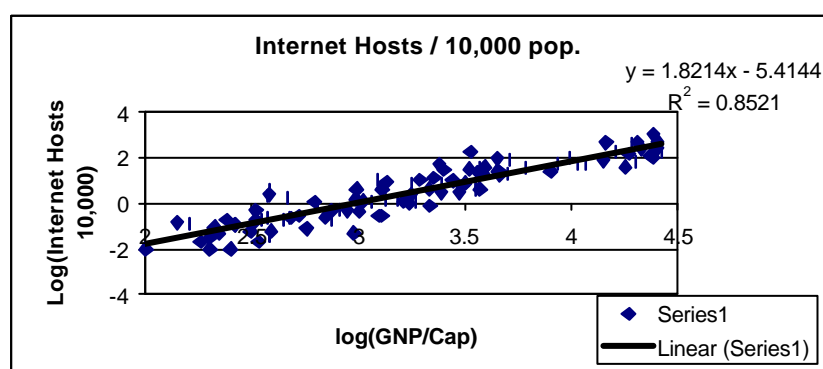
- the extremely poor power supply which results in frequent power failures
- few hardware maintenance facilities
- none or few software support facilities
- few training facilities for the above
- few application training facilities

For East Timor to have an effective government service that can deliver appropriate services to all the community, including those living and doing business outside of Dili, there must be support facilities for the computers and Intranets which interconnect them. These facilities will become part of government infrastructure.

In turn, many commercial enterprises, such as banks, airline services, hotels, restaurants and the like that operate in a manner which relies on an effective and reliable data network supported by computers, will also have a need for an effective Informatics industry, complete with the required support sectors.

Internet Hosts

The World Bank has also published data pertaining to the density of Internet Hosts per 10,000 of population. Converting this to graphical form results in the following¹¹:



$$b = 1.140$$

¹¹ Taken from data supplies in "2000 World development Indicators" Tables 1.1 "Size of the Economy" and 5.11 "The Information Age", The World Bank, Washington. D.C., U.S.A.

The correlation factor for this data is very high at 92%, suggesting that the number of Internet Hosts is related to GDP per Capita. Using a curve of best fit, this suggests that the following demand for Internet Hosts is appropriate for East Timor, based on the estimated future economic development of the country¹²:

Estimated Distribution of Internet Hosts by location						
	2000	2003	2005	2010	2015	2020
Dili	27	41	55	79	103	128
District Centres	1	5	10	21	34	48
Rural Areas	2	2	3	4	5	7
Total Computers	30	48	68	104	143	183

Considering the needs of Government, banks, airlines, shipping companies, large corporations, hotels, and other communications reliant industries, these estimates seem to be of the right order, for present and immediate future needs.

However, it should be noted that the growth rate for such services is very high and is in keeping with world-wide trends. It is likely to increase in penetration as the utility of such a service is better appreciated by the community at large. This growth will only be possible with adequate capacity provided by a low cost telecommunications service.

¹² Calculated using the derived curve of best fit formula :
 $\log_{10}(\text{Internet Hosts}/10,000 \text{ population}) = a + b \times \log_{10}(\text{GDP}/\text{Cap})$
 where $a = -5.414$
 $b = 1.821$

TELECOMMUNICATIONS SERVICES

The basic wire-line telephone service should comprise:

- Access, on a non-discriminatory basis, to a telephone at reasonable and affordable prices
- Access to the type of terminal equipment most suited to the needs of the customer. This can include facsimile machines, PABX's and Internet connections
- Access to information which enables customers to select the best equipment which meets his or her needs and information to effectively use the telecommunications network
- A customer friendly and speedy fault detection and repair service for all aspects of telecommunications
- Access to directory information
- Speedy connection of new services
- Connectivity to other telephone users within the country
- Connectivity to the international telecommunications network
- An accurate, customer friendly and informative telephone billing system
- Convenient and easy bill paying facilities

These considerations suggest that telecommunications should be provided by an organization which is market driven and customer friendly. It should have a visible presence in the main centres of population and be inspired to make it easy and pleasant for people to use the service.

Many of the above considerations should be the subject of Conditions of License to ensure that there is no doubt about the need to provide real service to customers.

The Government needs to appoint a Regulator to ensure that the Conditions of License are met within the spirit of the above. The Regulator should have as a prime responsibility the monitoring of service levels and complaints to enable corrective action to be implemented should customers not receive reasonable levels of service from the Licensed operator.

Factors affecting the development of telecommunications

In most communities operating above subsistence levels, it is likely that there will be many who will want, and can afford to pay for and use, a telecommunications system. However, for the beneficial widespread use of the network there are certain prerequisites. Some of these are :

- affordable prices of services
- the available level of disposable income which can be used for connection to the network and its utilization
- A level of literacy to facilitate the use the network effectively
- The availability of trained personnel to plan, install, maintain, market, operate and regulate the telecommunications facilities
- The financial strength of the entity operating the telecommunications network and its ability to secure funds needed for expansion
- The level of profitability of the network which acts as an incentive to invest in expansion of the network
- The geographic distribution of the network in relation to distribution of population which have need of telecommunications services.

The Telecommunications Regulator will have another important role to ensure that the Sector grows to extend service to all those who can reasonable afford to pay for such service and that new and advanced service offerings are made available whenever reasonable market conditions develop to warrant their introduction.

ASSUMPTIONS ON THE FUTURE OF TELECOMMUNICATIONS IN EAST TIMOR

Of fundamental importance is the assumption that East Timor will enjoy peace and tranquility in the foreseeable future. This will be important as steps are taken to build a nation where the population as a whole can participate in the development process and benefit from so doing.

Of major importance will be many of the policies that the new Government will adopt. Some of these policies will have to deal with :

- the proposed level of economic development
- centralization/decentralization of administration and development
- emphasis on literacy and education
- health and civic order
- role of the private sector in providing telecommunications services
- creation of an environment favourable to foreign investment. A commitment to encourage the availability of telecommunications will be important to a favourable environment

All of these factors will affect the rate of economic growth in each of the regions considered above.

Some factors will be determined by agencies other than the new Government. These will include :

- whether multi-lateral agencies will provide funds at concessional rates for development purposes
- whether bilateral aid will be provided and what level
- the level of foreign investment
- the discovery and exploitation of new resources

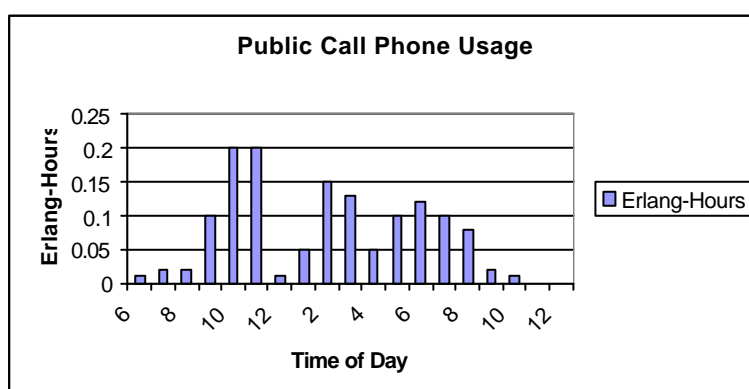
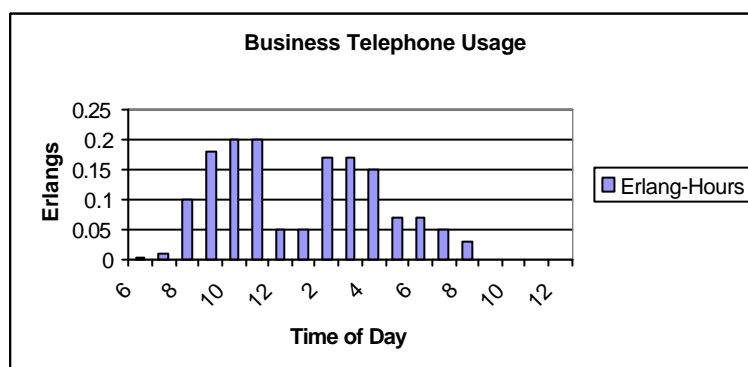
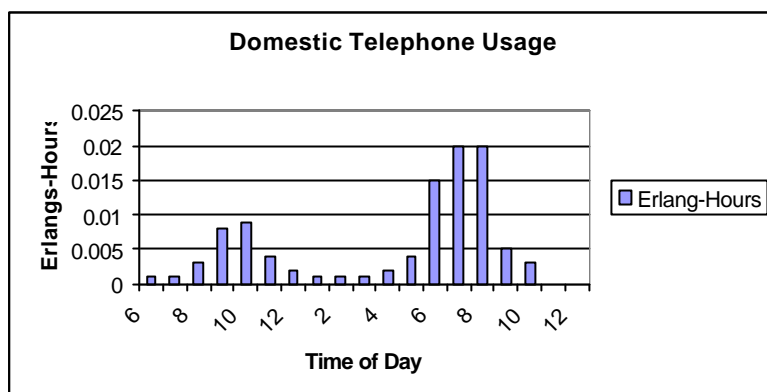
Particular telecommunications issues which need to be addressed are :

- the Conditions of License which will set the development environment for the duration of the License period
- the strength and independence of the Telecommunications Regulator to monitor and where necessary, enforce the execution of the Conditions of License
- the level of the License Fee in view of the fact that this will need to be recovered by the Licensee from the customer base and therefore load telecommunications charges to cover this.
- the operator's commitment to provide telecommunications to those who need it
- commitment to provide telecommunications to those who live and do business outside of Dili
- whether a cross-subsidy is required for District and Rural telephone customers
- the relative rate of development of the Dili network compared to the delivery of telecommunications in the Districts.
- the cost of the technical solutions chosen to meet East Timor's needs

TYPE & VOLUME OF TRAFFIC

Telephone Usage

It is appropriate to make some assumptions on the usage of the network by both business, residential and Public Call Phone customers. Below are some assumptions for the year 2000, based on experience of traffic elsewhere in the world. These estimates of usage may need to be revised in the light of information specific to East Timor.



For subsequent years, the following table indicates assumed use of the network by customers. It is assumed that increased economic activity and use of advanced facilities will encourage use of the network.

Erlang-Hours per Line		2000	2003	2005	2010	2015	2020
Dili							
Erlang-Hours/line	Business	1.50	1.54	1.58	1.62	1.66	1.70
	Domestic	0.10	0.11	0.12	0.13	0.14	0.15
District Capitals							
Erlang-Hours/line	Business	1.40	1.44	1.48	1.52	1.56	1.60
	Domestic	.010	0.12	0.14	0.16	0.18	0.02
Rural Areas							
Erlang-Hours/line	Business	0	0	0	0	0	0
	Domestic	0.20	0.22	0.24	0.26	0.28	0.30

A number of assumptions have been made to produce these estimates. Importantly it has been assumed that as the telecommunications network becomes more established and more people become connected to the network, people will use the network more. Again as more sophisticated services become available on the network, this in turn will stimulate usage yet again. It has been assumed that those who live further away from the Capital, Dili, will use the network more than those who reside in the Capital. In the Rural Areas, the usage will become much greater as the telecommunications network becomes a substitute for much more expensive travel. In rural areas, it is likely that neighbours will utilize the availability of an installed telephone service, increasing the usage pattern.

To estimate the revenue derived from the network, it is necessary to estimate the distribution of traffic originating in each of the types of location. The following table below indicates the assumed traffic distribution for both business and domestic customers;

Distribution of Traffic		2000	2003	2005	2010	2015	2020
Dili							
Bus	Dili	60.0%	59.0%	55.0%	53.0%	52.0%	50.0%
	East Timor	35.0%	36.0%	40.0%	42.0%	43.0%	45.0%
	Intl.	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Dom	Dili	94.0%	85.0%	80.0%	77.0%	72.0%	68.0%
	East Timor	5.0%	13.5%	18.2%	21.0%	25.7%	29.5%
	Intl.	1.0%	1.5%	1.8%	2.0%	2.3%	2.5%
District Capitals							
Bus	Intra-Dist	5.0%	10.0%	15.0%	20.0%	25.0%	30.0%
	D.C. - Dili	65.0%	62.0%	58.0%	50.0%	47.0%	45.0%
	East Timor	28.0%	26.0%	25.0%	28.0%	26.0%	23.0%
	Intl.	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Dom	Intra-Dist	25.0%	26.0%	30.0%	33.0%	36.0%	38.0%
	D.C. - Dili	50.0%	48.0%	46.0%	44.0%	42.0%	40.0%
	East Timor	24.0%	24.8%	22.6%	21.4%	20.2%	20.0%
	Intl.	1.0%	1.2%	1.4%	1.6%	1.8%	2.0%
Rural areas							
Bus	Intra-Dist	-	-	-	-	-	-
	East Timor	-	-	-	-	-	-
	Intl.	-	-	-	-	-	-
Dom	Intra-Dist	30.0%	28.0%	26.0%	24.0%	22.0%	20.0%
	Rural - Dili	50.0%	48.0%	46.0%	44.0%	42.0%	40.0%
	East Timor	19.0%	22.9%	26.8%	30.7%	34.6%	38.5%
	Intl.	1.0%	1.1%	1.2%	1.3%	1.4%	1.5%

Public Call Phones

For Public Call Phones, the following assumptions have been made regarding the provision of Public Call Phones per capita required in each of the regions. It should be noted that the assumption has been made that in the District Capitals there will be a lower level of demand for Pay Phones, but this may not be the

case. It may be that there may be many who cannot afford to have a personal phone connected to their dwelling but may need access to a pay phone to communicated with business, family and friends.

Public Call Phones						
Dili	2000	2003	2005	2010	2015	2020
Provision : Pop'n. per Call Phone	2,000	1800	1600	1400	1200	1000
Nos. of Public Call Phones	66	93	98	113	127	143
District Capitals						
Provision : Pop'n. per Call Phone	5,000	4600	4200	3800	3400	3000
Nos. of Public Call Phones	80	85	97	120	150	188

TELECOMMUNICATIONS FORECASTING MODEL

An attempt has been made to analyse a potential business case by means of a spreadsheet model. This model comprises a number of Excel Worksheets, supporting a statement of estimated Population, GDP per Capita, Telecommunications demand, Revenues and Expenses. The Model is entitled "East Timor Telecom Demand". This model has been constructed for a period of 20 years and assumes that an operator will be appointed some time in the year 2001 and will obtain a license to operate for a period of about 10 to 15 years on a Build Operate and Transfer (BOT) basis. Because of the uncertainties over such a long period, the results of the model must be taken as indicative only.

A number of fundamental assumptions have been described above in Sections entitled:

- Population Growth
- Forecast of Economic Activity
- Assumptions on the Future of Telecommunications in East Timor
- Type & Volume of Traffic

The starting point of the model is an estimate of population over the period considered.

The next estimate is the future level of economic activity as measured by GDP, and by utilising population estimates, an estimated GDP per Capita. This involved making assumptions on a number of sectors of the economy over the period. Further assumptions were made on the allocation of components of the economy to Dili, the District Capitals and the Rural Areas. It has been assumed that the level of economic activity per person in each District Capitals is the same, clearly a highly suspect assumption, but one which is made because of lack of substantiating information and the need to estimate the first order likely level of demand for telecommunications in each District Capital.

A major assumption is that a reasonable but a conservative level of telephone penetration can be estimated by utilising the telephone density of other countries with similar GDP/Capita. As explained above, by analysing data made available by the World Bank has provided an algorithm that relates telephone density, measured by telephones per 1,000 of population against GDP per Capita measured in US \$'s.

TARIFFS

The structure of tariffs will not only have an impact on revenues collected but also on the demand generated for various types of services.

A schedule of past and present tariffs are appended as Attachment 4 below.

Local and Long Distance calls

It has been proposed within ITPT that call charges should be uniform throughout the country. Current being considered is a uniform timed call for all calls, no matter where originating. Given the fact that longer distant calls will utilize more extensive (and more expensive) equipment than local calls, it will be readily be seen that calls made over the shorter distances such as those within, say, three Km from the central exchange or Digital Line Unit in District Capitals, will be subsidizing those, made over longer distances. However, the cost differences between short and long distance calls, with large volumes of traffic, are small.

Whilst economic theory suggests that all subsidies result in the distorted allocation of resources, it can be argued that within closed user groups, such as telecommunications users, there are some benefits in measures which increase the numbers of destinations which can be called at low marginal costs. This can be done through pricing practices which provide incentives to people to use the service through low connection and service charges. Likewise, it can be argued that pricing policies which increase the numbers of calls made, such as longer distance calls which have lower prices through cross-subsidies, increase the flow of information and social contact, which may be perceived as an increase in economic and social utility of the investment.

Whatever the argument, the analysis undertaken above suggests that people living outside of Dili have lower GDP/capita than those in Dili, and hence one could assume that this translates into lower disposable income than those living and working in Dili. Cross-subsidies which increase their ability to utilize the telecommunications network would assist in the economic and social development of those living outside of Dili while providing incentives from more affluent city dwellers to call them.

This would suggest that there is merit in opting for a policy of adopting a uniform timed call regime.

The current Telstra tariff provides for a fairly high monthly service charge with zero charges for calls. This may be appropriate for the current circumstances where there are no transmission facilities connecting other parts of East Timor to Dili, but for the future, some call charges are appropriate to set prices which are related to the costs of providing service. This will place some financial incentive for customers to utilize the network efficiently and in a cost effective manner.

International calls

Many countries in the past have set tariffs for international calls at rates which far exceed the costs of providing such a service. The profits generated from such a service was supposedly used to cross-subsidise other less profitable services, especially local calls. This would appear to have been the case in East Timor prior to September 1999.

As countries recognize that excessive international call rates inhibit international business and provide a disincentive to foreign investment and tourism, international tariffs have been reduced in many countries, especially those who have opted for competition in the provision of international services.

Besides the reasons for supporting a favourable climate for business, there are important social reasons why international tariffs should be kept low as practical. Significant numbers of East Timorese, forced to flee their homeland in 1999 are now living in Australia, Indonesia, Portugal and other places. To assist social cohesion it is important that international telephone charges be kept as low as practical to enable individual, family and community contacts to be maintained.

RISKS TO THE BUSINESS CASE

The greatest risk in preparing such a business case is that associated with the future social and political tranquility of the nation. While there has been a transition to independence, it has been necessary for the United Nations to use force to restore peace and tranquility. Many of the militias who caused the devastation to the infrastructure and other assets of East Timor are now in neighbouring West Timor. Some have made incursions into East Timor with malicious intent but up till now have been dealt with by the ever watchful UN forces. While there have been international pressures to forcibly disarm these militias in West Timor, all effort so far has been to little effect. It remains to be seen if these destabilising elements can be eliminated to give East Timor a future secure from armed upheaval.

As mentioned a number of times above, the East Timorese' ability to fill the important positions of Government and business remains an open question. Whilst there are now signs that the economy is undergoing a renaissance, with new little enterprises being established weekly, it remains to be seen whether the East Timorese will be able to rise to the challenges of establishing a competent Government and developing policies suitable for their future and implementing them effectively. With assistance from a number of sources, this should not be a problem.

The analysis indicates that the profitability of the telecommunications sector will depend upon the ability of East Timor to increase the level of economic activity through productivity measures, thereby increasing the level of wealth created. The question of income distribution will become very important in determining the demand for telecommunications, because telecommunications consists of high technology that has to be paid for, at world parity prices, through discretionary disposable income from those who demand the use of such a facility. The more people who can afford telecommunications, the more the demand will be.

Currently there is no detailed and reliable data on the costs of providing service to the various areas, nor are there policies developed to deal with potential cross-subsidies needed to extend the network into areas adjacent to the District Capitals. There is a risk that the appointed License holder chosen to undertake the Build, Operate and Transfer Contract will limit activity to those areas covered by the conditions of license and to those areas where the cost of providing service is low and hence profitable. This will limit the benefits provided by an extensive telecommunications system both to those who use the network and those who have a need to use the network but have no access.

CONCLUSIONS

Estimating the demand for telecommunications for East Timor is very difficult, given the lack of reliable information on which to build an estimating platform. In addition, the lack of a clear political and economic scenario for the future makes forecasting very hazardous for the confidence in the accuracy needed for investment purposes.

Notwithstanding the difficulties in this task, it has been possible to construct a model which enables assumptions to be made in a logical sequence and results in a set of forecasts which are a first cut estimate of what is possible. If East Timor continues to grow economically as fast as many other developing countries at similar levels of development, then the base case demand forecast would appear be reasonable as first cut estimates. As better information becomes available, it should be possible to refine the estimates and increase the degree of confidence in them.

TARIFFS: PAST & PRESENT

National Telecommunications Tariff Information

Pre- September, 1999

East Timor (Exchange rate: US\$ 1.00 = Rp 8,000)

Item	DILI		
	Business	Residential	Social
New Connection fee for Telephone			
- Cost for new connection	Rp 225,000 US\$ 28.125	Rp 150,000 US\$ 18.75	Rp 75,000 US\$ 9.375
- Service fee (per month)	Rp 30,000 US\$ 3.75	Rp 20,000 US\$ 2.50	Rp 13,000 US\$ 1.625
- Tax	Rp 3,000 US\$ 0.375	Rp 2,000 US\$ 0.25	Rp 1,300 US\$ 0.1625
- In house wiring	Rp 93,100 US\$ 11.64	Rp 93,100 US\$ 11.64	Rp 93,100 US\$ 1.64
New Connection for Fax			
- Cost for new connection	Rp 225,000 US\$ 28.125	Rp 150,000 US\$ 18.75	Rp 75,000 US\$ 9.38
- Service fee (per month)	Rp 30,000 US\$ 3.75	Rp 20,000 US\$ 2.50	Rp 13,000 US\$ 1.625
- Tax	Rp 3,000 US\$ 0.375	Rp 2,000 US\$ 0.25	Rp 1,300 US\$ 0.16

1. Connection Cost for Telex

Cost connection	Rp 225,000	US\$ 28.125
Service fee (per month)	Rp 180,000	US\$ 22.50
Tax 10%	Rp 18,000	US\$ 2.25

2. **Telegram cost per word** Rp 25 US\$ 0,003

3. Telephone Conversation cost (per pulse):

Local Call	Rp 145	US\$ 0,018
National Long Distance Call	Rp 112	US\$ 0,014

Tariff Table for National Long Distance Calls
Working Days (Monday until Saturday)

ZONE	Distance (Km)	Tariff per Minute					
		0600-0700	0700-0800	0800-1800	1800-2000	2000-2300	2300-0600
I	30 - 200	Rp 484,85 US\$ 0,061	RP 963,86 US\$ 0,121	Rp 1,200,- US\$ 0,15	Rp 963,86 US\$ 0,123	Rp 484,85 US\$ 0,061	Rp 242,49 US\$ 0,03
II	> 200 - 500	Rp 675,24 US\$ 0,084	Rp 1.345 US\$ 0,17	Rp 1,680 US\$ 0,21	Rp 1,344 US\$ 0,168	Rp 675,24 US\$ 0,084	Rp 340,56 US\$ 0,043
III	> 500	Rp 842,95 US\$ 0,11	Rp 1,680 US\$ 0,21	Rp2,100 US\$ 0,26	Rp1,680 US\$ 0,21	Rp 842,95 US\$ 0,11	Rp 425,26 US\$ 0,053
Rate		Cheap	Economy	Standard	Economy	Cheap	Super Cheap

Tariff Table for National Long Distance Calls
Sundays and Holidays

ZONE	Distance (Km)	Tariff per Minute	
		0600 – 2300	2300 – 0600
I	30 - 200	Rp 480 US\$ 0.06	Rp 240 US\$ 0.03
II	> 200 – 500	Rp 675 US\$ 0.084	Rp 340 US\$ 0.0425
III	> 500	Rp 840 US\$ 0.105	Rp 420 US\$ 0.0525
Rate		Cheap (50%)	Super Cheap (25%)

International Tariff Information

Group I Tariff = Rp 4,900 per minute = US\$ 0.6125 / minute

No	Country	Country Code	No	Country	Country Code
1	Bangladesh ***	880	6	Laos **	856
2	Bhutan ***	975	7	Macau **	853
3	Brunei Darussalam **	673	8	Mongolia **	976
4	Burma (Myanmar) **	95	9	Vietnam **	84
5	Cambodia **	855			

Group II Tariff = Rp 5,650 per minute = US\$ 0.70625 / minute

No	Country	Country Code	No	Country	Country Code
1	Afghanistan ***	93	66	Korea North ***	850
2	Algeria ****	213	67	Kuwait ***	965
3	Angola ****	244	68	Kyrgyztan ***	996
4	Anguilla **	1264	69	Leshoto ****	266
5	Antigua and Barbuda **	1268	70	Liberia ****	231
6	Antilles Netherlands **	599	71	Libya ****	218
7	Argentina **	54	72	Madagascar ***	261
8	Armenia ***	374	73	Malawi ****	265
9	Aruba **	297	74	Malaysia **	60
10	Ascension ****	247	75	Mali ****	223
11	Azerbaijan ****	994	76	Martinique **	596
12	Bahamas **	1242	77	Mauritania ****	222
13	Bahrain ***	973	78	Mauritius ***	230
14	Barbados **	1246	79	Mayotte ***	2696
15	Belize **	501	80	Mexico **	52
16	Benin ****	229	81	Montserrat **	1664
17	Bermuda **	1441	82	Marocco ****	212
18	Bolivia **	591	83	Mozambique ****	258
19	Botswana ****	267	84	Namibia ****	264
20	Brazil **	55	85	Nicaragua **	505
21	Burkina Faso ****	226	86	Niger ****	227
22	Burundi ***	257	87	Nigeria ****	234
23	Cameroon ****	237	88	Oman ***	968
24	Cayman Islands **	1345	89	Panama **	507
25	Central Africa ****	236	90	Papua New Guinea *	675
26	Chad ***	235	91	Paraguay **	595
27	Chile **	56	92	Peru **	51
28	Christmast Island *	61891	93	Puerto Rico **	1787
29	Cocos Islands *	61891	94	Qatar ***	974
30	Colombia **	57	95	Reunion. Island ***	262
31	Comoros ***	2697	96	Rwanda ****	250
32	Congo ****	242	97	Sao Tome & Principe ****	239
33	Costa Rica **	506	98	Senegal ****	221
34	Cuba **	53	99	Seychelles ***	248
35	Diego Garcia ****	2469	100	Sharawi (Western Sahara) ****	246
36	Djibouti ***	253	101	Siera Leone ****	232
37	Dominica **	1767	102	Singapore **	65
38	Dominican. Rep **	1809	103	Somalia (Inc. Galkaio) ***	252
39	Egypt ****	20	104	South Africa ****	27
40	El Salvador **	503	105	St. Kitts and Navis **	1869
41	Equador **	593	106	St. Lucia **	1758
42	Eritrea ****	291	107	St. Pierre & Miquelon **	508
43	Ethiopia ***	251	108	St. Vincent & the Grenadine **	1809/1784
44	Falkland Island (Malvinas) **	500	109	Sudan ****	249
45	Faroe. Islands ****	298	110	Suriname **	597
46	Gabon ****	241	111	Swaziland ****	268
47	Gambia ****	220	112	Tajikistan ***	7
48	Ghana ****	233	113	Tanzania ***	255
49	Greenland **	299	114	Tatarstan ***	7513
50	Grenada **	1473	115	Togo ****	228
51	Guadeloupe **	590	116	Trinidad & Tobago **	1868

52	Guatemala **	502	117	Tunisia ****	216
53	Guiana. French **	594	118	Turk & Caicos Island *	1649
54	Guinea Bissau ****	245	119	Turkmenistan ***	993
55	Guinea Equatorial ****	240	120	Uganda ***	256
56	Guinea. Rep. ****	224	121	Uruguay **	598
57	Guyana ****	592	122	Uzbekistan ***	998
58	Haiti **	509	123	Venezuela **	58
59	Honduras **	504	124	Virgin Island. US**	1340
60	Iran ***	98	125	Virgin Island. UK (Tortola) **	1284
61	Iraq ***	964	126	Yemen ***	967
62	Ivory Coast (Cote d'Ivory) ****	225	127	Zaire ****	243
63	Jamaica **	1876	128	Zambia ****	260
64	Kazakhstan ***	7	129	Zimbabwe (Rhodesia) ****	263
65	Kenya ***	254	130		

Group III Tariff = Rp 6,250 per minute = US\$ 0.78125 / minute

No	Country	Country Code	No	Country	Country Code
1	Cyprus ****	357	9	Palau. Rep *	680
2	Guam *	1671	10	Philippines **	63
3	Israel ****	972	11	Rusia. Fed ***	7
4	Jordan ****	962	12	Saipan (Mariana Island) *	1670
5	Lebanon ****	961	13	Sri Lanka ***	94
6	Maldives ***	960	14	Syria ****	963
7	Nepal ***	977	15	Thailand (Muangthai) **	66
8	Pakistan ***	92			

Group IV Tariff = Rp 7,150 per minute = US\$ 0.89375 / minute

No	Country	Country Code	No	Country	Country Code
1	Alaska **	1097	30	Macedonia ****	389
2	Albania ****	355	31	Majuro (Marshall Islands) *	692
3	Andorra ***	376	32	Malta ****	356
4	Antartic Base *	6721	33	Moldova ****	373
5	Azores & Madeira ****	351	34	Monaco ****	377
6	Belarus ****	375	35	Nauru *	674
7	Bosnia & Herzegovina ****	387	36	New Caledonia *	687
8		359	37	Niue Island **	683
9	Bulgaria ****	349	38	Norfolk Islands *	6723
10	Canary Islands ****	238	39	Poland ****	48
11	Cape Verde ****	682	40	Portugal ****	351
12	Cook. Islands **	385	41	Roumania ****	40
13	Croatia ****	420	42	Samoa. America **	684
14	Czech ****	372	43	Samoa. Westem **	685
15	Estonia *	679	44	San Marino ****	378
16	Fiji *	358	45	Serbia ****	381
17	Finland ****	689	46	Slovak ****	421
18	French Polynesia (Tahiti) **	691	47	Slovenia ****	386
19		995	48	Solomon. Islands *	677
20	F.S. of Micronesia *	350	49	St. Helena ****	290
21	Georgia ***	30	50	Tokelau *	690
22	Gibraltar ****	36	51	Tonga *	676
23	Greece ****	354	52	Turkey ****	90
24	Hungary ****	353	53	Tuvalu *	688
25	Iceland ****	686	54	Ukraine ****	380
26	Ireland ****	371	55	Vanuatu *	678
27	Kiribati *	4175	56	Vatican ****	379
28	Latvia ****	370	57	Wallis & Futuna *	681
29	Liechtenstein ****	352	58	Yugoslavia ****	381
	Lithuania ****				
	Luxembourg ****				

Group V Tariff = Rp 8,300 per minute = US\$ 1.0375 / minute

No	Country	Country Code	No	Country	Country Code
1	Australia *	61	5	Korea South *	82
2	Canada **	1	6	New Zealand *	64
3	Hawaii **	1808	7	Taiwan **	886
4	Hong Kong **	852	8	United State of American **	1

Group VI Tariff = Rp 9,400 per minute = US\$ 1.175 / minute

No	Country	Country Code	No	Country	Country Code
1	Arab Emirate ***	971	4	Saudi Arabia ***	966
2	India ***	91	5	United Kingdom ****	44
3	Japan *	81	6		

Group VII Tariff = Rp 10,700 per minute = US\$ 1.3375 / minute

No	Country	Country Code	No	Country	Country Code
1	Austria ****	43	7	Italy ****	39
2	Belgium ****	32	8	Netherlands ****	31
3	China ***	86	9	Norway ****	47
4	Denmark ****	45	10	Spain ****	34
5	France ****	33	11	Sweden ****	46
6	Germany ****	49	12	Switzerland ****	41

Legend

*	Standard Tariff = 100 % Charge Tariff	Period : > 06:00 - < 09:00
	Reduced Tariff = 75 % Charge Tariff	Period : > 12:00 - < 22:00
	Premium Tariff = 120 % Charge Tariff	Period : 22:00 - 06:00 Period : 09:00 – 12:00
**	Standard Tariff = 100 % Charge Tariff	Period : > 07:00 - > 09:00
	Reduced Tariff = 75 % Charge Tariff	Period : > 12:00 - < 23:00
	Premium Tariff = 120 % Charge Tariff	Period : 23:00 – 07:00 Period : 09:00 – 12:00
***	Standard Tariff = 100 % Charge Tariff	Period : > 08:00 - < 11:00
	Reduced Tariff = 75 % Charge Tariff	Period : > 14:00 - < 00:00
	Premium Tariff = 120 % Charge Tariff	Period : 00:00 - 08:00 Period : 11:00 -14:00
****	Standard Tariff = 100 % Charge Tariff	Period : > 11:00 - < 14:00
	Reduced Tariff = 75 % Charge Tariff	Period : > 17:00 - < 03:00
	Premium tariff = 120 % Charge Tariff	Period : 03:00 – 11:00 Period : 14:00 – 17:00

Mobile Telephone Tariffs East Timor As at 1st May 1999

Monday to Saturday

Exchange Rate US\$ 1 = Rp 8.000

Loading Time			Local		National		
Local	National	Time	Flag-fall	Timed Units 0	Flag-fall	Timed Units 1	Timed Units 2
Economic	Economic/Cheap	0600 – 0700	Rp 325 \$ 0.41	Rp 84 \$ 0.011	Rp 325 \$ 0.41	Rp 810 \$ 0.101	Rp 1005 \$ 0.125
Economic	Economic	0700 – 0800	Rp 325 \$ 0.41	Rp 84 \$ 0.011	Rp 325 \$ 0.41	Rp 1610 \$ 0.201	Rp 2010 \$ 0.25
Business/Economic	Business/Standard	0800 – 1800	Rp 406 \$ 0.051	Rp 84 \$ 0.011	Rp 406 \$ 0.051	Rp 2010 \$ 0.25	Rp 2515 \$ 0.32
Business/Economic	Business/Economic	1800 – 2000	Rp 406 \$ 0.051	Rp 84 \$ 0.011	Rp 406 \$ 0.051	Rp 1610 \$ 0.201	Rp 2010 \$ 0.25
Business/Economic	Business/Cheap	2000 – 2200	Rp 406 \$ 0.051	Rp 84 \$ 0.011	Rp 406 \$ 0.051	Rp 810 \$ 0.101	Rp 1005 \$ 0.125
Economic	Economic/Cheap	2200 – 2300	Rp 325 \$ 0.41	Rp 84 \$ 0.011	Rp 325 \$ 0.41	Rp 810 \$ 0.101	Rp 1005 \$ 0.125
Economic	Economic/Cheaper	2300 – 0600	Rp 325 \$ 0.41	Rp 84 \$ 0.011	Rp 325 \$ 0.41	Rp 810 \$ 0.101	Rp 1005 \$ 0.125

Sundays & Holidays

Charging Categories			Local		National		
Local	National	Time	Flag-fall	Timed Units 0	Flag-fall	Timed Units 1	Timed Units 2
Economic/Cheap	Economic/Cheap	0600 – 2300	Rp 325 \$ 0.41	Rp 84 \$ 0.011	Rp 325 \$ 0.41	Rp 810 \$ 0.101	Rp 1005 \$ 0.125
Economic/Cheaper	Economic/Cheaper	2300 – 0600	Rp 325 \$ 0.41	Rp 84 \$ 0.011	Rp 325 \$ 0.41	Rp 410 \$ 0.051	Rp 505 \$ 0.063

MOBILE PHONE CALL INTERCONNECT COSTS :

Flag-fall : Rp 325 / \$ 0.41
Local Timed Units 0 : Rp 84 / \$ 0.011

HALOcard to PSTN = 1 * Flag-fall + Local Timed Units0
 HALOcard to HALOcard = 2 Flag-fall
 HALOcard to Other Mobile = 2 Flag-fall + Local Timed Units0

National Timed Units 1 : Rp 1610 / \$ 0.201

HALOcard to PSTN = 1 * Flag-fall + National Timed Units1
 HALOcard to HALOcard/Other Mobile = 2 Flag-fall + National Timed Units1

National Timed Units 2 : Rp 2010 / \$ 0.25

HALOcard to PSTN = 1 * Flag-fall + National Timed Units2
 HALOcard to HALOcard/Other Mobile = 2 Flag-fall + National Timed Units2

TIMED UNITS 0 (LOCAL ZONE/SEL-0)

Day	Kind of Call	Call Tariff / minute						
		0600 - 0700	0700 - 0800	0800 - 1800	1700 - 2000	2000 - 2200	2200 - 2300	2300 - 0600
Monday - Saturday	HALOcard – PSTN	Rp409 \$ 0.051	Rp 409 \$ 0.051	Rp 490 \$ 0.06	Rp 490 \$ 0.06	Rp 490 \$ 0.06	Rp 409 \$ 0.051	Rp 409 \$ 0.051
	HALOcard – HALOcard	Rp 650 \$ 0.08	Rp 650 \$ 0.08	Rp 813 \$ 0.10	Rp 813 \$ 0.10	Rp 813 \$ 0.10	Rp 650 \$ 0.08	Rp 650 \$ 0.08
	HALOcard – Other Mobile	Rp 734 \$ 0.09	Rp 734 \$ 0.09	Rp 897 \$ 0.11	Rp 897 \$ 0.11	Rp 897 \$ 0.11	Rp 734 \$ 0.09	Rp 734 \$ 0.09
Sundays & Holidays	HALOcard – PSTN	Rp 409 \$ 0.051	Rp 409 \$ 0.051	Rp 409 \$ 0.051	Rp 409 \$ 0.051	Rp 409 \$ 0.051	Rp 409 \$ 0.051	Rp 409 \$ 0.051
	HALOcard – HALOcard	Rp 650 \$ 0.08	Rp 650 \$ 0.08	Rp 650 \$ 0.08	Rp 650 \$ 0.08	Rp 650 \$ 0.08	Rp 650 \$ 0.08	Rp 650 \$ 0.08
	HALOcard – Other Mobile	Rp 734 \$ 0.09	Rp 734 \$ 0.09	Rp 734 \$ 0.09	Rp 734 \$ 0.09	Rp 734 \$ 0.09	Rp 734 \$ 0.09	Rp 734 \$ 0.09

TIMED UNITS 1 (DESTINATION IN SAME AREA/SEL-1)

Day	Kind of Call	Call Tariff / minute						
		0600 - 0700	0700 - 0800	0800 - 1800	1700 - 2000	2000 - 2200	2200 - 2300	2300 - 0600
Monday - Saturday	HALOcard – PSTN	Rp 1135 \$ 0.142	Rp 1935 \$ 0.242	Rp 2416 \$ 0.30	Rp 2016 \$ 0.252	Rp 1216 \$ 0.152	Rp 1135 \$ 0.142	Rp 735 \$ 0.10
	HALOcard – Other Mobile	Rp 1460 \$ 0.182	Rp 2260 \$ 0.282	Rp 2823 \$ 0.353	Rp 2423 \$ 0.31	Rp 1623 \$ 0.20	Rp 1460 \$ 0.182	Rp 1060 \$ 0.132
Holidays	HALOcard – PSTN	Rp 1135 \$ 0.142	Rp 1135 \$ 0.142	Rp 1135 \$ 0.142	Rp 1135 \$ 0.142	Rp 1135 \$ 0.142	Rp 1135 \$ 0.142	Rp 735 \$ 0.01
	HALOcard – Other Mobile	Rp 1460 \$ 0.182	Rp 1460 \$ 0.182	Rp 1460 \$ 0.182	Rp 1460 \$ 0.182	Rp 1460 \$ 0.182	Rp 1460 \$ 0.182	Rp 1060 \$ 0.132

TIMED UNITS 2 (DESTINATION TO DIFFERENCE AREA/SEL-2)

Day	Kind of Call	Call Tariff / minute						
		0600 - 0700	0700 - 0800	0800 - 1800	1700 - 2000	2000 - 2200	2200 - 2300	2300 - 0600
Monday - Saturday	HALOcard – PSTN	Rp 1330 \$ 0.16	Rp 2335 \$ 0.292	Rp 2921 \$ 0.36	Rp 2416 \$ 0.3	Rp 1411 \$ 0.17	Rp 1330 \$ 0.16	Rp 830 \$ 0.10
	HALOcard – Other Mobile	Rp 1655 \$ 0.21	Rp 2660 \$ 0.33	Rp 3328 \$ 0.42	Rp 2823 \$ 0.353	Rp 1818 \$ 0.23	Rp 1655 \$ 0.21	Rp 1155 \$ 0.14

Sundays & Holidays	HALOcard – PSTN	Rp 1330 \$ 0.16	Rp 1330 \$ 0.16	Rp 1330 \$ 0.16	Rp 1330 \$ 0.16	Rp 1330 \$ 0.16	Rp 1330 \$ 0.16	Rp 830 \$ 0.1
	HALOcard – Other Mobile	Rp 1655 \$ 0.21	Rp 1655 \$ 0.21	Rp 1655 \$ 0.21	Rp 1655 \$ 0.21	Rp 1655 \$ 0.21	Rp 1655 \$ 0.21	Rp 1155 \$ 0.14

*) These Tariffs do is not include Tax.. (Tax = 10%)

Charge Pulse Timing : - Timed Unit 0 is 20 seconds
- Timed Units 1 and 2 are 15 seconds.

Current Telstra Charges (US\$)

Wire-line Phone Charges

Connection Fee Business	\$ 71.00
Connection Fee Private	\$ 39.50

Monthly Service Charge – Business	\$ 7.00
Monthly Service Charge – Private	\$ 4.50

Call Charges (for Dili Only)	Free
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**For Tenderers
(See File:
XI-Model)**

Model for determining

- **Population Growth**
- **GDP / Capita**
- **Telephone density**
- **Telephone Demand**
- **Estimates of Telephone Usage and**
- **Call distribution**