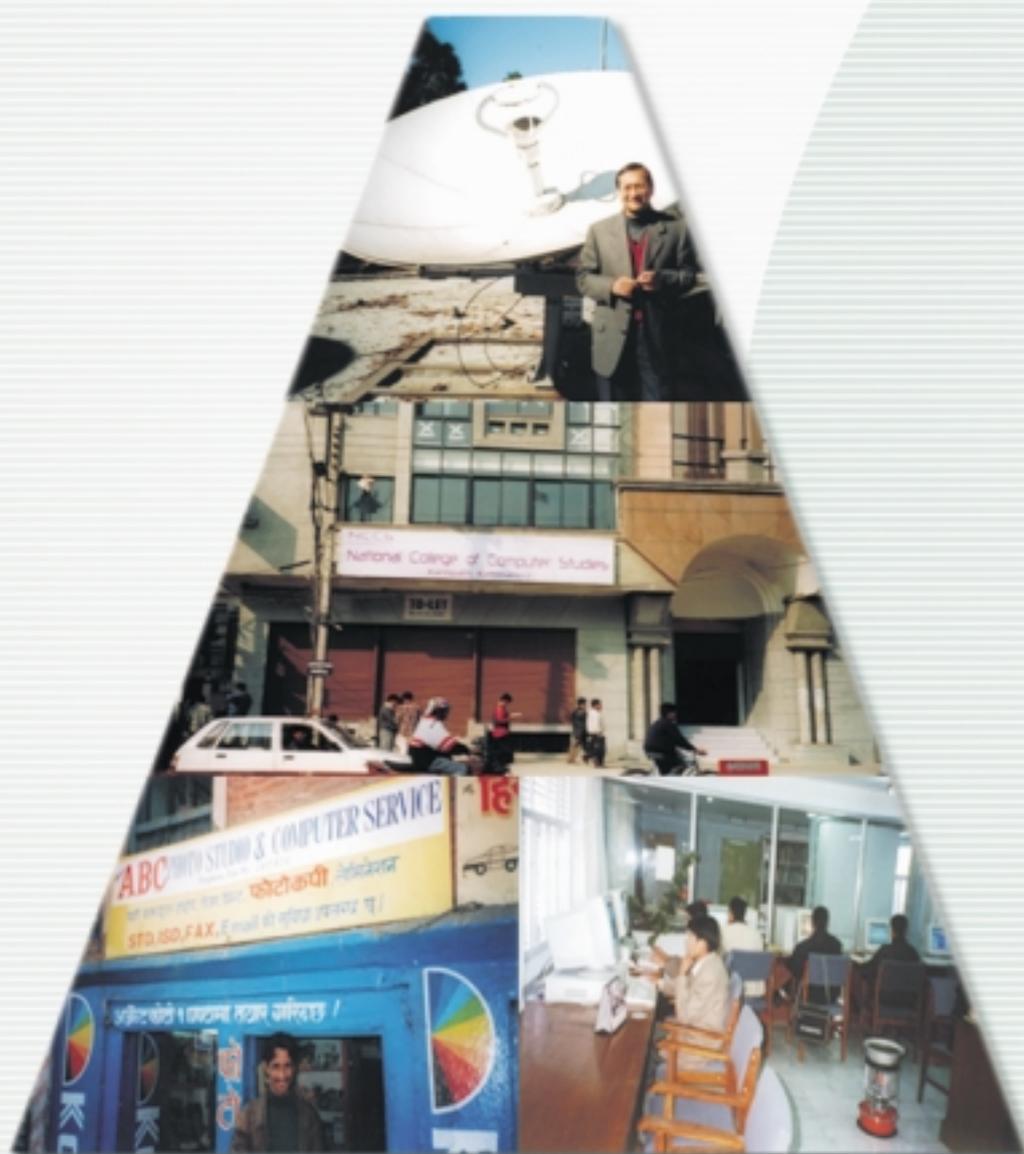


The Internet from the top of the world:

Nepal Case Study



International Telecommunication Union



November 2000

THE INTERNET FROM THE TOP OF THE WORLD: NEPAL CASE STUDY



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This report was drafted by Sy Goodman, Tim Kelly, Michael Minges and Larry Press. Lakshmi Rajagopal contributed to the country overview chapter. Vanessa Gray provided comments. The cover of the report was designed by Dalia Mendiluce. The layout, formatting and production of the report was carried out by Nathalie Delmas. The report is based on field research conducted during 17-21 January 2000 and electronic correspondence as well as reports and articles. The authors are indebted to Amrit R. Pant, Shashank Kansal and numerous other people who provided input to the report and the time they spared for our many questions (for a list of people and organizations met during the field research see Annex 1). The opinions expressed in the report are those of the authors and may not necessarily reflect the views of the International Telecommunication Union or its members or the Kingdom of Nepal. More details can be found on the website at <http://www.itu.int/ti/casestudies>.

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1. Country background

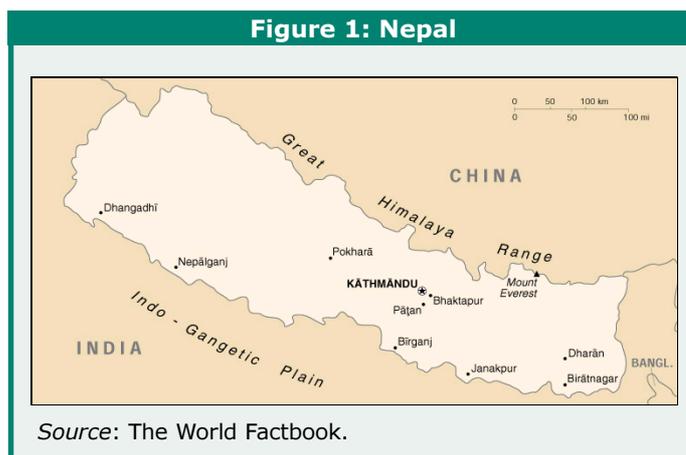
1.1 Overview

The Kingdom of Nepal is situated in South Asia, on the Southern slopes of the Himalaya mountain range, which separates tropical India from the semi-arid central Asian plateau. Nepal is an elongated, rectangular country, with an area of approximately 147'181 square kilometres—about the same as Greece or Bangladesh. Geopolitically, the nation lies between India and China, and is landlocked.

Administratively, Nepal is divided into five development regions and 75 districts. The lowest administrative division is the Village Development Committee (VDC) of which there are 3'996.

1.2 Demography

The last census carried out in Nepal took place in 1991 when the number of inhabitants living in the country was estimated at 18.5 million (see Table 1.1). More recent estimates differ depending on the source. For example, 1996 estimates include: 22 million (World Bank), 20.8 million (Nepal Central Bureau of Statistics) and 21.1 million (UN). The population of Nepal is around the same as Malaysia and Venezuela. Population growth is high, between 2.4 – 2.7 per cent a year.



The country does not ascend gradually, but rises in several chains of hills that lie in an East-West orientation, finally terminating in the Himalayas. Beyond the Himalayas is the 5'000 metre high Tibetan plateau. Within this small area, fall many climatic zones - tropical jungles in the Terai plains, Arctic desert in the high regions, and arid zones in the Tibetan plateau. Nepal consists of three geographic regions: the low-lying Terai region (17 per cent of the total land area), the Mountain region (64 per cent) and the Himalayan region (19 per cent). Eight of the world's ten tallest peaks, including the highest Mt. Everest, are located in Nepal.

The number of people living in Kathmandu, the capital, was estimated at over 900'000 in 1998, accounting for 4.4 per cent of the country total. Only half a dozen other cities in the country have a population over 10'000. Some 91 per cent of the inhabitants of Nepal reside in rural areas. Half the population is between the ages of 15 and 59, with a further 42 per cent below the age of 15. Less than 6 per cent of the population is above 60 years of age.

Nepal is a Hindu kingdom - the only officially Hindu country in the world. Over 85 per cent of its population is Hindu. The rest is comprised of Buddhists (the country claims to be the

Table 1.1: Population indicators

Year & Item	1981 Census	1991 Census	1998 Projection
Total Population	15,022,839	18,491,097	21,349,345
Male	7,695,336	9,220,974	10,641,286
Female	7,327,503	9,270,123	10,708,059
Total Households	2,585,154	3,328,721	3,845,056
Average Household Size	5.8	5.6	5.6
Literacy Rate of 6 Years and above	23.3	39.6	46
Population Density Per sq. km.	102.1	123	142
Age Distribution:			
Below 15 yrs	42.4%		
15-59 yrs	51.5%		
Above 60 yrs	5.8%		
Urban Population:	9%		

Source: UNDP Nepal. <<http://www.undp.org.np/keydoc/nprofile/demography.htm>>

birthplace of Buddha), Muslims and others. Nepali is the official language (spoken by about half the population; more than a dozen other languages are also used). English is widely understood in tourist areas.

1.3 Economy

Nepal's 1997 Gross National Product (GNP) of US\$ 4.8 billion, is, on a per capita basis US\$ 210, statistically making the nation one of the poorest countries in the world. Indeed the kingdom is classified by the UNDP as a Least Developed Country (LDC), with nearly half its population living below the poverty line. However GNP expressed in purchasing power parity (PPP), which adjusts GNP according to the price level in the country, was US\$ 1'090 in 1997, placing it at the high end among the LDCs.

The economy grew at five per cent a year between 1990 – 97. Agriculture is the mainstay of the economy, and occupies 80 per cent of the population, accounting for 41 per cent of the GDP. Services make up 35 per cent, industry 22 per cent and manufacturing 10 per cent. Industrial activity mainly comprises of the processing of agricultural products. Foreign ex-

change over the last couple of years was mainly earned through textiles and carpet making.

The country imports almost four times more than it exports. The main imports are petroleum, transport equipment and fertilizer. Major exports include carpets, garments and leather. Tourism provides around 20 per cent of Nepal's export earnings. As an LDC, Nepal benefits from significant bi-lateral and multilateral assistance, accounting for almost nine per cent of its GDP.

Since 1991, the government has tried to push through economic reform, and encourage trade and foreign investment. Political instability, however, including the fall of five governments over the past few years, coupled with the small size of the economy, the remoteness of its location, and vulnerability to natural disasters, poses great challenges for development.

Nepal is a landlocked country with two giant neighbours. Nepal mainly counts on India for sea access, and its relation with India is thereby crucial. A dispute between the two in the 1980s, for example, led India to revoke the Trade and Transit Treaty with Nepal,

Table 1.2: Nepal Macroeconomic indicators

Gross National Product:	\$4.8 billion (1997)		
GNP Per Capita:	\$210 (1997)		
GNP Measured at PPP:	\$1090 (1997)		
GDP Growth Rate:	5% (1990-97 average)		
Structure of Economy:	<u>Sector</u>	<u>% of GDP</u>	<u>Growth Rate</u>
	Agriculture	43	2.2%
	Industry	22	7.7%
	Manufacturing	10	6.6%
	Services	35	
International Trade:			
Exports	US\$ 400 mil.		
Imports	US\$ 1'653 mil.		
Current Account Balance	US\$ 569 mil.		
Trade Deficit as % of GDP	25.3%		
<u>Major Exports</u>	<u>Major Imports</u>		
1. Woollen Carpets	1. Petroleum Products		
2. Ready-made Garments	2. Transport Equipment & Parts		
3. Leather	3. Chemical Fertilizer		
4. Pulses	4. Raw Wool		
5. Raw Jute and Jute Goods	5. Cotton thread		
Foreign Direct Investment:	\$19 million (1996)		
External Debt:	(26% of GNP) \$2'413 million		
Official Development Assistance (ODA):	8.9% of GNP		
Gross Domestic Investment:	22% (of GNP)		
Gross Domestic Saving:	8% (1997)		
Inflation Rate:	8.3% (1990-97 average)		

Source: Nepal - An Economic Handbook, Economic Relations and Coordination Division, Ministry of Foreign Affairs, June 1999. <http://www.undp.org.np/keydoc/nprofile/macro_econm.htm>

which caused it much hardship. India is also a major donor to Nepal, with preferential trade treatment given to it.²

1.4 Human development

Nepal ranked 144th out of 174 countries in the UNDP's 1999 Human Development Index. Indicators of human development for the country are shown in the UNDP report on the country at <<http://www.undp.org.np/keydoc/nprofile/humandev.htm>>. Although it has made major progress, Nepal ranks low in a number of indicators compared to countries in the South Asian region. The UNDP Human Poverty Index (HPI)

is a function of the percentage of people expected to die before age 40, of adults who are illiterate, of populations without access to health services, of populations without access to safe water, and of children under five who are under-weight. As seen in table 1.3, Nepal trails nations in the region (Bhutan was not covered in the report).

1.5 Political

The Nepalese government became a parliamentary democracy under a constitutional monarchy in May 1991¹, and enjoys universal suffrage. Nepal was ruled by the House of Gorkha for

nearly three centuries before it came into conflict with the British East India Company in the 19th century. The resulting Anglo-Nepalese war devastated Nepal, reducing it to its present size, and this was followed by three decades of aristocratic factious infighting. Rulership by the hereditary Rana rule began in 1846, and gave way, in 1951, to a return of the original monarchy of the Kingdom, which took charge of all

executive powers and the armed forces.

In 1962, King Bir Bikram Shah Dev set up a centrally controlled partyless council system of government called the *Panchayat*. Increasing opposition and disillusionment with this system led to the pro-democracy movement.

The Movement for the Restoration of Democracy was formally established in Nepal in 1990. Political unrest, agitation, demonstrations and rallies led to the replacement of the *Panchayat* system with a multi-party interim government in 1990. General elections were held in 1991, with 65% of the populace voting.³

King Birendra is presently head of state, and commander-in-chief, while the prime minister heads a council of ministers appointed from the elected House of Representatives. The Supreme Court acts as court of appeal, and has powers of original jurisdiction. Elections in 1999 saw the Nepali Congress win an absolute majority of seats in parliament, and Krishna Prasad Bhattarai sworn in as Prime Minister.⁴

Table 1.3: Human poverty indicators

Nation	HPI
China	19
Sri Lanka	20
India	36
Pakistan	42
Bangladesh	44
Nepal	52

Source: UNDP Human Poverty Index, www.undp.org/povertyreport.

¹ <<http://tradeport.org/ts/countries/nepal/political.html>> (February 8, 2000)

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² <<http://tradeport.org/countries/nepal/political.html>> (February 8, 2000)

Source: UN Department of Commerce – National Trade Data Bank, September 3, 1999.

³ <<http://lcweb2.loc.gov/cgi-bin/query2/>>

⁴ <<http://www.nepalhomepage.com/general/political-structure.html>> (February 8, 2000)

2. Information and communication technology status

2.1 Telecommunication sector

2.1.1 History and current status

The history of telecommunications in Nepal is relatively recent. A line between Kathmandu and the Indian border was opened in 1914, but it was not until 1955 that the capacity of the local exchange in Kathmandu reached 300 lines. Telex service opened in 1972 and the first satellite earth station was installed in 1982. Prior to that most international traffic, as well as much of the domestic long-distance traffic, was conducted by short-wave radio.

The modernisation of Nepal's telecommunications dates back to the First Telecommunication Project, commenced in 1970. At that time, the country had a total line capacity of 5'350 lines, split between three exchanges. By the end of the first Five Year Plan, in 1975, there were some 7'100 lines and ten years later this had increased to 20'691. Thereafter, the pace of growth began to accelerate, reaching 82'774 lines by 1995.

But the major growth has occurred since 1995. The number of telephone main lines in use in Nepal, in mid-November 1999 was 234'668 compared with 191'594 in the same month a year earlier, a growth rate of 22 per cent. The acceleration in growth rates is mainly due to a World Bank loan, introducing transparent international tendering, which has increased the number of lines that can be purchased for the same price by threefold. The World Bank has extended two loans during the 1990s to Nepal for telecommunications. The first was approved in 1992 for the amount of US\$ 55 million. The second was approved in 2000 for the amount of US\$ 45 million. In the latter half of the 1990s, Nepal has grown as fast, if not faster, than any other country in the

South Asia region (see Figure 2.1), despite the absence of foreign investment.

An important milestone was reached in 1999 when teledensity reached one line per 100 inhabitants. However, there are still more than 260'000 on the waiting list, implying an average waiting time of more than six years (those on the waiting list have paid a deposit of 50 Rs, just under 1US\$). The price of line connection is 2'000 Rs (around US\$29). Around two-thirds of the telephones are in the Kathmandu valley, which accounts for less than 3 per cent of the population. Kathmandu itself has a teledensity of 18.2 lines per 100 inhabitants compared with 1.07 in the country as a whole and 0.06 in rural areas (data for mid-November 1999). Figure 2.2 shows the level of teledensity in Nepal's 75 districts. Of these districts, 5 do not have a local exchange and use HF radio. Although some of the districts have an exchange, no lines are connected. In total, twelve districts are without any direct service. The total population of these districts without direct service is 1.2 million.

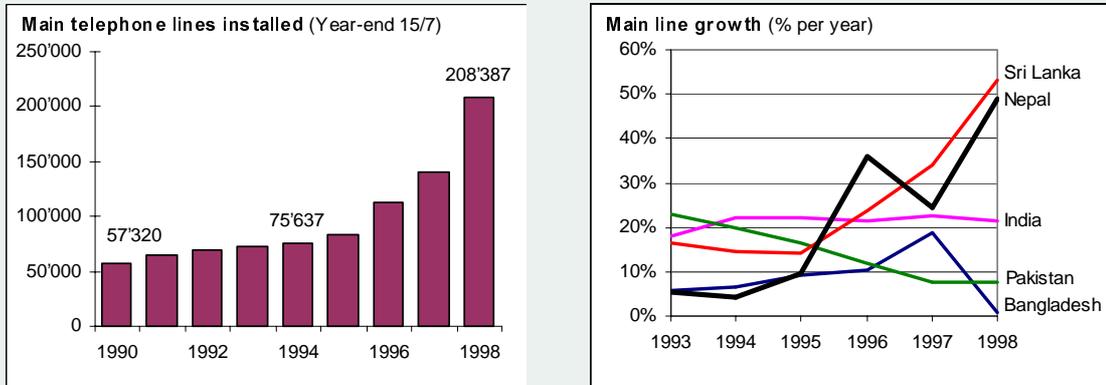
2.1.2 Industry structure

2.1.2.1 Regulatory structure

Telecommunications in Nepal fall under the responsibility of the Ministry of Information and Communications (MoIC) and is regulated under the terms of the 1997 Telecommunications Act.⁵ The Act itself is the outcome of a National Communications Policy, which was initiated in 1992. The Act established a regulatory body, the Nepal Telecommunications Authority (NTA), as an autonomous and corporate body, with a mission of "managing and regularising the Telecommunications Service and making it reliable and easily available to the public". The chair of

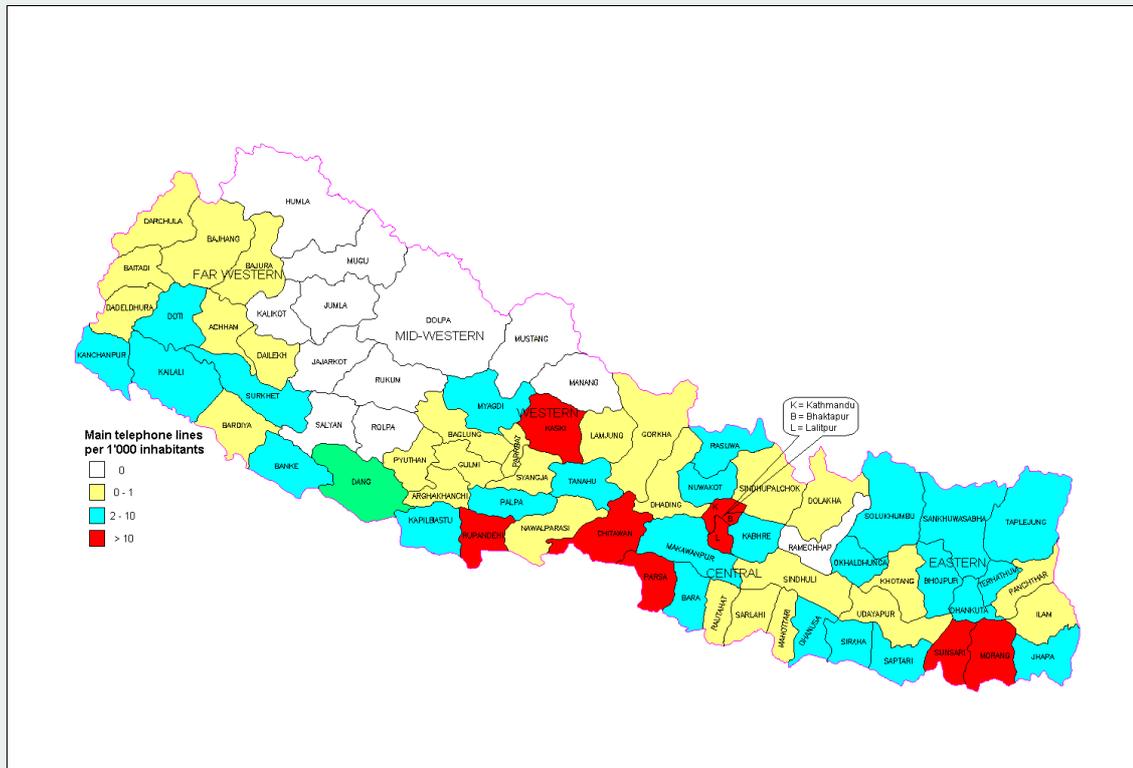
Figure 2.1: Fixed-line networks

Number of main telephone lines, in Nepal, 1990-98, and comparative growth rates within region, 1993-98



Note: The data for Nepal is for financial year end 15 July. Thus, data shown for 1998 means year ending 15/7/99.
Source: ITU World Telecommunication Indicators Database.

Figure 2.2: Teledensity by district



Source: ITU adapted from NTC data.

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the Authority is Mr Bhoop Raj Pandey and there should be four other members of the NTA, though to date two positions remain vacant.

The Nepal Telecommunications Corporation (NTC) is the incumbent public telecommunications operator and, until recently, held a monopoly over all aspects of telecommunications in the Kingdom. The chair of the Board of Directors is Mr Shree Ram Poudel, the Secretary of the MoIC. The significance of this is that it means NTC is not fully independent of the government and therefore the corporatisation process, which was initiated under the National Communications Policy of 1992, has not been effectively implemented. For instance, according to the terms of the Act, the Minister of Information and Communications is also chair of the Radio Frequency Policy Determination Committee, which administers and allocates spectrum. Furthermore, the fact that NTC is still effectively a government corporation means that it has only limited access to external financing. The lack of a strategic partner, even in the mobile field, has delayed the introduction of modern management techniques.

As of mid-November 1999 NTC employs some 4'661 people, implying a labour productivity level of 50 lines per employee, around 40 per cent of the global average. The high potential growth activities, including mobile cellular, Internet and business activities are grouped into a "Cellular Mobile and New Services" unit that employs about 60 people.

2.1.2.2 Privatisation

NTC is fully state-owned though there are plans to corporatize and privatize the company. The plans, as outlined in the Telecommunication Sector Strategy document, foresee the introduction of a strategic investor, which would take just over 50 per cent of the shares, with additional shares going to local investors. Senior management within NTC is apparently keen to press ahead with privatisation, but there is opposition from the staff union. Furthermore, the necessary initial step of corporatization has not yet been ef-

fectively carried out. One indication of this is the fact that the MoIC still provides the Chairman of the NTC board.

There is a privatisation unit within the Ministry of Finance, which has already carried out around 16 smaller privatisations, but the telecommunications sector is not considered a priority because it is "profitable". Incidentally, in the civil aviation field, there are now 17 private domestic airlines, including Buddha Air, Necon and Lumbini Air. These new airlines have succeeded in increasing domestic air travel by 400 per cent since the early 1990s even though they are competing against the state-owned Royal Nepal, which operates all international flights. Experience from this sector, which is regulated by the Tourism Ministry, shows that private sector participation can work in Nepal.

2.1.3 Regulation and policy-making

2.1.3.1 Licensing

The 1997 Act established a licensing regime, which has been actively pursued by the regulator, Mr Pandey, who was described as a "godsend" by the private sector. Areas that were liberalised in the Act include the Internet Service Provider (ISP) market, radiopaging and data communications via Very-Small Aperture Terminals (VSAT). There is no limitation on the number of licences that can be issued in these areas. In addition, the Cable TV market, which is regulated under the 1991 National Broadcasting Act by the MoIC, is also liberalised. Table 2.1 shows a list of licenses granted by mid-January 2000. It should be noted that in some areas that are notionally liberalised, including payphones and pre-paid calling service, trunking mobile and local data communications, there have been no requests for licences to date.

2.1.3.2 Market liberalisation

The general policy direction was established in the 1992 National Communications Policy and has recently been elaborated in a Telecommunication Sector Strategy document, prepared for the World Bank in October 1998 by Telecon Ltd., a Finnish consultancy. The document divides the

Table 2.1: Telecommunication licences granted by NTA

As at mid-January 2000

<i>Service</i>	<i>No. of licences</i>	<i>Service</i>	<i>No. of licences</i>
VSAT provider	4	Internet (with email)	11 (9 operational)
VSAT user	11	Fax-mail	3
Radio-paging	5	Video-conferencing	1
Cellular mobile	1		

Source: NTA.

timetable for market liberalisation into three stages: steps to be taken immediately, by the year 2000 and no later than the year 2004. In practice, there has been slippage on most of the targets. The market liberalising moves that were intended to be carried out "immediately" were enacted only in September 1999. Furthermore, the licensing of a wireless local loop (WLL) competitor to NTC, which was due to be tendered in 1998 and to start operations by the end of 1999, has still not started. The regulator had announced in the press that the tender documents would be available in December 1999, but they were still working on them in January 2000. One delay has arisen because MoIC was slow in allocating frequencies. This delay may have been due to the close relationship between the ministry (MoIC) and the operator (NTC).

The most serious delay has been in the licensing of mobile service. A tender was carried out around three years ago. However, the process ended up in court and was overturned because it was argued that the then government had acted unconstitutionally (the period since parliamentary democracy was established in 1991 has been politically unstable with frequent changes of party, which have politicised the civil service). NTC started a mobile service (using GSM 900) during 1999 and, as of mid-November 1999, had 3'154 sub-scribers. NTC is one of the

few developing country operators that decided to establish a mobile operator without assistance from a strategic partner. It does not offer pre-paid service.

The further expansion of mobile and the introduction of a second operator is likely to be constrained by the numbering plan, which is still under the control of the NTC. Furthermore, the tender for the second GSM operator, which is expected to be issued at the same time as the tender for the WLL operator, is not expected to include an international gateway. Given that NTC currently gains around 60 per cent of its revenue from international operations, and charges high prices for international calls, the fact that the second GSM operator is not able to provide its own connectivity is likely to have the effect of reducing the perceived value of the license.

According to the terms of the Act, licences would normally be issued for a maximum period of 25 years with renewal after ten. It is likely to be stipulated that there be a minimum of 20 per cent Nepali ownership. However, it is noted in the Act that, where foreign ownership is greater than 50 per cent, the land, building plant and equipment would revert to state ownership after the expiry of the license period and would have to be re-purchased by the operators at a price set by the regulator.

2.1.3.3 Tariff rebalancing and inter-connection

Unlike in India where the regulator's initiative on tariff rebalancing and interconnection has proved so crucial to telecom reform, NTA does not appear to have taken any action on this issue. Indeed, NTC's opinion is that, because its charter dates from before NTA was established, it is not regulated for basic services by NTA. It has submitted a tariff increase plan to MoIC and the Ministry of Finance, but not to NTA. The plan would see local call charges double from 1 Rs to 2 Rs (around 2.8 US cents) for a three minute peak rate call. Monthly subscription charges, which are currently set at 150 Rs for both business and residential subscribers, including 100 free 3-minute local calls, would also double. The tariff rebalancing plan also sees long distance calls rising (with a cut from five zones to three) and some international call charges falling, with a reduction in international call zones from four zones to two.

While tariff rebalancing is necessary, there having been no change for the past eight years during which time inflation has averaged 6-8 per cent per year, it is unfortunate that NTA has not been permitted to make an independent review. Furthermore, proposals submitted by the ISPs to allow revenue-sharing of the local call charge (allowing, for instance, the provision of "free Internet", funded by local call charges) have not been acted upon by NTC, nor has consideration been given to a lower monthly subscription for lines, which do not make outgoing local calls (e.g., the lines rented by ISPs). The only area where NTC seems responsive to customers is for international leased line charges where NTC cut its charges drastically after the private ISPs installed their own VSAT links.

As NTC does not compete directly with the private sector, the question of interconnect has not yet arisen, though it will obviously become a critical issue once the new licenses are issued. NTA does not appear to be intending

to take an active stance, but will rather leave it to NTC to negotiate with its competitors. The experience of the ISPs is that the published tariff is effectively the interconnect rate. In the Telecommunication Strategy document put forward by Telecon Ltd., it is proposed that interconnect rates be set at 50 per cent of the published tariff (so, to interconnect to the PSTN would cost 50 per cent of the local call tariff and to interconnect to a mobile network would cost 50 per cent of the cost of a mobile call). Given that local call tariffs have not been revised for years, this arrangement is likely to be highly asymmetric.

2.1.4 Network

2.1.4.1 Backbone network

One advantage of Nepal's network being relatively young is that it is all-digital with the majority having been installed in the last few years. The backbone of the network is a digital microwave link, which runs from East to West, offering some 20'000 voice channels. In addition, there are spurs, which link the major cities and districts using Multi Access Rural Telephone System (MARTS) technology. Other areas of the country are served by short-wave radio or by VSAT, of which there are currently seven in service. The main international links are via a fibre optic cable to India and via INTELSAT. There is also a digital microwave link to Bangladesh. In total, there were 854 international telephone circuits in operation at mid-November, up from 804 a year earlier.

There are plans afoot to create a fibre ring around Kathmandu (already started) and an east-west fibre link running alongside the main highway (tendering for this project is expected soon). The Kathmandu ring is being financed from NTC's own funds whereas the east-west link may be funded, in part, from Nordic development funds. In addition to the seven existing VSATs, a further five are planned to make up a regional satellite network as a back-up to the terrestrial network.

2.1.4.2 Rural access

Nepal has around 4'000 Village Development Councils (VDCs). Some 1'535 of the VDCs (39 per cent) have telephone access and the stated goal is to provide every VDC with at least two telephones by the year 2003. This goal is likely to slip to at least 2005. The NTA has imposed a 2 per cent tax on all licensed operators (including ISPs) to contribute towards the Rural Telecommunication Development Fund (RTDF), with contributions starting in 1999/2000. In theory, any licensee may bid to use the funds.

The NTC has around 200 or so "recognized" Public Call Offices (PCOs) around the country, which get a modest reduction on long distance call charges and in some cases a monthly subsidy. There are around 1'000 or so unlicensed Public Call Centres (PCCs) around the country, mainly in the Kathmandu region, which seem to offer the main hope for extending access. The PCCs offer a range of services including long distance and international telephone, fax, call-back, photocopy, Internet, e-mail, air tickets etc. PCCs are helping to grow the next generation of entrepreneurs. In other countries, one might expect the PCCs to be selling mobile phones but this

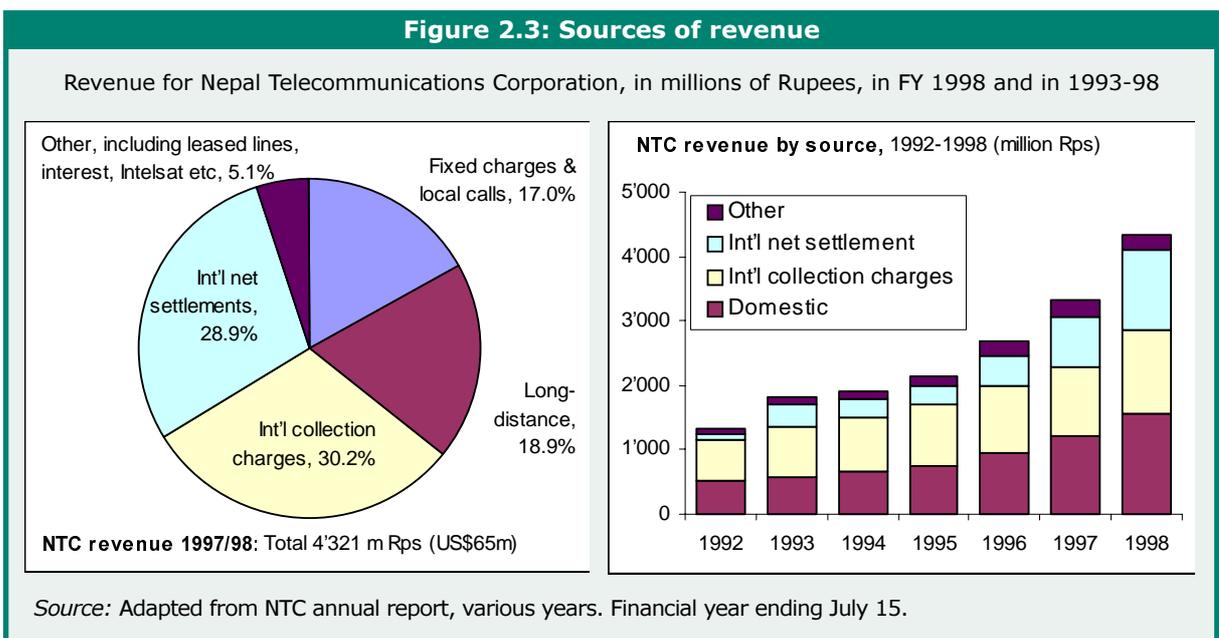
does not seem to be the case. Indeed, the NTC seems to look down on the PCCs. It does not know how many there are and does not seem to care. The private sector seems to be taking a more enlightened approach and several of the PCCs are agents for the privately-run ISPs and radio-paging operators.

It is planned that the new mobile licensee will have an obligation to invest at least 15 per cent of its revenue in rural areas, as defined by the regulator. However, it does not appear that the existing mobile operator (NTC) carries this obligation. Furthermore, since the new mobile operator is not able to provide international service, this constraint on its license may only serve as a further deterrent to possible investors.

2.1.5 International service

2.1.5.1 International traffic

Like many small developing countries, Nepal is highly dependent on revenues from international services. This is reflected in the fact that almost 60 per cent of NTC's revenue comes from international services, of which half is from collection charges and the rest from international net settlements (see Figure 2.3). Indeed, the level of dependence on international net settle-



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ments as a percentage of overall revenue has increased from 7 per cent in 1991/92 to 29 per cent in 1997/98.

Nepal has international connections with some 20 different countries (mainly via INTELSAT) and offers direct dial service to more than 130. Recently, home-country direct services have been established to five major destinations. Nepal's top international traffic destination is India, though much of the traffic to India is cross-border and is conducted outside the international accounting rate system. For incoming traffic, India is again the main source, with a total of just over 10 million minutes in the year to June 1999, of which the majority was from cross-border (via India's DoT) rather than international traffic (via India's VSNL).

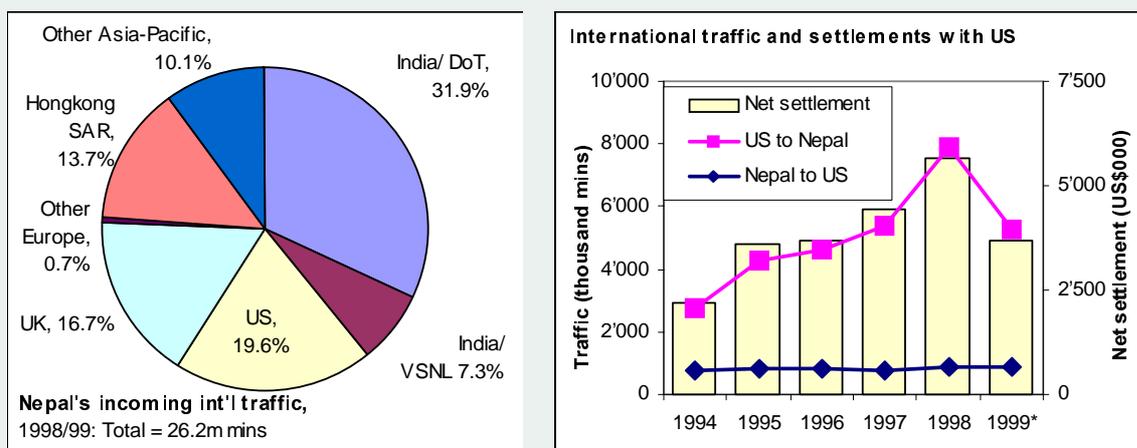
For international traffic passing through the accounting rate system, the major source is the United States. As Figure 2.4 (right chart) shows, Nepal has a ratio of incoming to outgoing traffic with the United States of around nine to one, a ratio, which had continued to grow throughout the decade until 1999. This is consistent with other developing countries (for in-

stance, India's ratio in 1997 was 11:1 and Vietnam's was 40:1). This is mainly due to the fact that the United States is home to the major call-back service providers. Nepal has nominally banned call-back, though there is no law stating this and the service is widely advertised on the streets of Kathmandu. Furthermore, the increase in settlement revenue over the last few years suggests that call-back is widely practiced.

The result is that US operators made net settlements (excluding transit payments) of some US\$5.7 million in 1998. However, the picture appears to be changing. In the first seven months of 1999, the annualised rate of traffic reported as incoming from the United States (AT&T) was down by just over 30 per cent with a particularly big fall in July, the same month that VSAT data traffic began to be delivered to Nepal. The same pattern is true also for the United Kingdom where incoming traffic from BT fell by almost 40 per cent. Interestingly, in the same month, incoming traffic from all other sources grew by 28 per cent suggesting that refile traffic may be growing. While it would be unwise to draw conclusions

Figure 2.4: Nepal's international telephone traffic

Incoming international traffic, by origin country, 1998/99, and Nepal's traffic and settlements with the United States, 1994-99



Note: In the left chart, the breakdown shows the immediate origin of traffic, not necessarily the real origin (i.e., includes transit traffic). It is based on the 12 months ending July 1999. In the right chart, the figures for 1999 are estimated based on the first seven months of the year. The data are for calendar years ending 31 December.
Source: NTC, FCC.

Table 2.2: Major telecommunication indicators for Nepal

1990-1999, Year Ending 15.7 unless otherwise noted

Unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
TELEPHONE NETWORK										
Main telephone lines in operation	57'320	64'894	68'886	72'683	75'637	83'713	112'645	139'989	208'387	247'214
Capacity used	...	...	...	...	88.8%	85.2%	77.9%	77.8%	81.5%	85.8%
Main telephone lines per 100 inhabitants	0.32	0.35	0.36	0.37	0.38	0.41	0.54	0.66	0.95	1.11
Residential main lines per 100 households 3)	1.69	2.08	2.14	2.13	2.12	2.35	3.22	3.78	5.32	6.16
% digital main lines %	89.5	86	86	87	89	99.2	99.8	99.3	100	100
Waiting list for main lines	72'434	88'548	126'817	130'009	136'221	153'751	202'363	243'444	277'997	269'025
Total demand	129'754	153'442	195'703	202'692	211'858	236'474	315'008	383'433	486'384	516'239
Satisfied demand	44.2%	42.3%	35.2%	35.9%	35.7%	35.0%	35.8%	36.5%	42.8%	47.9%
Public payphones	248	266	341	321	494	494	835	...	...	...
Districts having exchanges	...	...	...	30	30	31	54	57	60	65
% of total	...	...	...	40.0%	40.0%	41.3%	72.0%	76.0%	80.0%	86.7%
Village Development Committees served	...	...	...	...	...	...	950	1'200	1'675	1'535
% of total	...	...	...	...	...	...	23.8%	30.0%	41.9%	38.4%
TRAFFIC										
Local telephone calls 10x3	...	...	169'343	193'789	215'279	330'700	440'900	...	...	...
Per subscriber, per month	...	...	205	222	237	333	326	...	...	...
National trunk telephone (calls) 10x3	...	...	19'035	22'779	29'033	42'700	57'300	...	...	...
Int'l outgoing telephone (minutes) 10x3	7'091	9'111	10'405	11'510	13'410	14'600	16'533	17'326	19'100	25'100
Int'l incoming telephone (minutes) 10x3	6'373	9'394	14'230	16'400	17'500	20'600	25'600	31'000	28'900	22'900
Int'l bothway telephone (minutes) 10x3	13'464	18'505	24'635	27'910	30'910	35'200	42'133	48'326	48'000	48'000
STAFF										
Full-time telecommunication staff	3'502	3'546	3'413	3'599	3'483	3'877	4'078	4'151	4'529	4'671
QUALITY OF SERVICE										
Faults per 100 main lines 1) %	192	180	168	156	200	262	180	120	80.4	78.8
REVENUE										
Total telecom services (NRs) 10x6	699	1'147	1'316	1'818	1'905	2'147	2'677	3'320	4'321	4'633
Total telecom services (US\$) 10x6	\$ 24	\$ 31	\$ 31	\$ 37	\$ 39	\$ 41	\$ 47	\$ 57	\$ 65	\$ 68
Revenue per line	\$ 415	\$ 474	\$ 447	\$ 515	\$ 510	\$ 500	\$ 419	\$ 409	\$ 314	\$ 275
CAPITAL EXPENDITURE										
Annual telecommunication investment (NRs) 2) 10x6	696	755	311	99	540	879	1'695	1'163	1'475	1'873
Annual telecom. Investment (US\$) 10x6	\$ 24	\$ 20	\$ 7	\$ 2	\$ 11	\$ 17	\$ 30	\$ 20	\$ 22	\$ 27

Note: 1) Yearly estimate from average per month for Kathmandu Valley exchanges. 2) Additions to fixed assets. 3) Estimate.

Source: Nepal Telecommunications Corporation (NTC).

on the basis of one month's data, and there may be other reasons for the change (for instance, re-routing of transit traffic) the available evidence would seem to point towards an increasing percentage of traffic from AT&T and BT being diverted outside the accounting rate system, possibly via the Internet (see section 3.3). If July 1999's trend had continued for the rest of the year, the lost revenue to NTC would have been around US\$4-5 million, or just under 10 per cent of total telecommunications revenue.

2.1.6 Market indicators

Table 2.2 provides a listing of the major telecommunication indicators for Nepal extracted from the ITU Yearbook of Statistics.

2.2 Information Technology sector

This section reviews key organizations in the IT sector, the status of the computer hardware and software markets and Internet service provision. Government ministries with a direct role in IT include the MST and MOIC (yet ironically it seems that neither even has a web site!). The former is the coordinating agency for IT in the country while the latter provides oversight for the telecommunication, postal, mass media and broadcasting sectors. Most major industries in Nepal have an association. The Computer Association of Nepal (CAN, <<http://www.caninfo.org>>) fulfils this role for the IT industry. Created in late 1992, CAN's 40-60 institutional and 2-3'000 individual members include vendors, software developers and other professionals involved in Nepal's computer sector. It sponsors the annual Info-Tech show with between 50-60 exhibitors and 10'000 attendees. Another IT-related organization is the Nepal Internet Users Group (Nepaliug, <<http://www.nepaliug.org.np>>). It was started in 1997 to serve the Internet community in Nepal. Elsewhere such groups sometimes play a national educational role, or at least a consciousness-raising role, with regard to the Internet, e.g., through short

courses, well advertised lectures, ect. The NIUG has some ambitions along these lines. However, membership is still very small, with less than 200 individuals belonging.

2.2.1 Computer market

There are around 100 companies selling computer equipment in the country. As there is no domestic computer manufacturing industry, all hardware is imported. This includes branded units (e.g., IBM, Dell, Compaq, etc.) as well as unbranded parts that are then assembled in Nepal. There is no official data on the size of the computer hardware market. However since all computer equipment is imported, estimates can be derived from trade data. Statistics compiled by an industry association show that the value of computers and parts imported into Nepal for the 1998 fiscal year (latest year for which data are available) was US\$ 6.26 million.⁶ This data indicates that the value of imports of computers and parts rose through mid-1995 and then declined (see Table 2.3). This is curious given that the Internet started in Nepal in 1995, and this might have been expected to cause a sharp rise in computer imports.

The drop in import value might be explained by falling prices, but unfortunately data on the *number* of computers imported is not available. Another explanation might be the Indian computer market. Until recently, personal computers in Nepal were cheaper than in India. This encouraged the re-export of PCs from Nepal to India. Since the liberalisation of the Indian computer market, fewer computers are being re-exported from Nepal. Yet another explanation is that equipment is imported via distributors in Singapore or Hongkong SAR and not captured in official statistics. Conversations with various sources suggest that the number of PCs sold in Nepal in 1999 was between 10'000 - 15'000 units and that the stock of PCs in the country could be as high as 100'000. However, ITU research suggests that the number of PCs in the country is around 60'000. This places PC penetration in Nepal at 0.27 per 100 inhabit-

Table 2.3: Imports of computers and parts

	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99
Imports of Computers and Parts (Rs m)	436	792	1'307	1'043	485	413	
Imports of Computer and Parts (US\$ m) a)	\$ 8.97	\$ 16.04	\$ 25.18	\$ 18.41	\$ 8.37	\$ 6.26	
Estimated PC imports (units) b)	6'000	11'000	17'000	12'000	6'000	5'000	10'000
Estimated PC stock c)	10'000	15'000	30'000	40'000	45'000	50'000	60'000

Note: a) Converted at annual average exchange rate. b) Based on a value of US\$ 1'500 per PC for 1992-1997 and US\$ 1'300 for 1997/98. Figure for 1998/99 based on low end of industry estimate for 1999. c) Based on rounded figure of additions for each year. Assumes no replacement.

Source: ITU adapted from Research and Information Division of FNCCI from various publications of Nepal Rastra Bank.

ants, slightly lower than India and Pakistan but above Bangladesh.

Both branded and assembled PCs are sold on the market. It is estimated that around 75 per cent of PCs sold are assembled (e.g., non-branded clones). Transport is estimated to add about 10-12 per cent to the price of a PC. Customs duty is 12 per cent and sales tax is 10 per cent.⁷ A fully equipped Pentium III branded PC sells for around US\$3'000 while a clone is available for less than Rs. 65'000 (around US\$ 1'000). These prices are not substantially higher than what is available in more developed countries but, given the low incomes in Nepal, they are beyond the reach of the majority of the population.

The computer software market primarily consists of customization of branded accounting and financial software. According to one estimate, there are around 25 companies engaging in software development.⁸ No figures are available on imports or sales. One area of native software development has been in the development of packages utilizing the Nepali font.

2.2.2 The Internet market

In 1994, the first companies appeared on the market offering dial-up email service (via UUCP). Mercantile Office Systems became the first Internet

Service Provider (ISP) in mid-July 1995 when it established an online international link via NTC to Singapore Telecom. WorldLink and Computerland followed a year later. The legal status of these pioneering ISPs was vague until 1997 when the new Telecommunications Act formalised a licensing procedure.

In January 2000, there were eleven licensed Internet Service Providers (ISPs) of which at least nine were operational (see Table 2.4).⁹ Besides providing service to residential and business users, these ISP also resell service to specialized providers (e.g., HealthNet, which subscribes to Mercantile's ISP services and in turn provides a discounted ISP service to the health community) and public call offices and cybercafés. The number of Internet subscribers was almost 9'000 at January 2000.

Estimating the number of Internet users in the country is difficult.

- No known surveys have been carried out, either by the Central Bureau of Statistics or by market research groups.
- There are large variations in the ratio of subscribers to users. While a multiplier of three might be appropriate for residential subscribers, the ratio

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Table 2.4: ISPs in Nepal

Situation at January 2000

	Name	Start-up Date	Subscribers	Staff	Web site
1	Worldlink	1996	4'350	71	< http://www.wlink.com.np/ >
2	Mercantile	1995	1'347	28	< http://www.mos.com.np/ >
3	Computerland	1996	887	37	< http://www.ccsI.com.np/ >
4	Capital Online	1999	650	68	< http://www.col.com.np/ >
5	Unlimited Nu Media	Nov-99	555	28	< http://www.unlimit.com/ >
6	Infocom	1999	500	30	< http://www.info.com.np/ >
7	Everest Net	Sep-99	373	17	< http://www.multinepal.com.np/ >
8	Himilayan	Jul-99	190	22	< http://www.hons.com.np/ >
9	Global Internet Service*				
10	Network Technologies*				
11	HTP Communications*				< http://www.htp.com.np/ >
Nepal			8'852	301	

Note: * These ISPs did not reply to an NTA questionnaire casting doubt on whether they were actually operational at January 2000.

Source: ITU adapted from National Telecommunication Authority and ISP data.

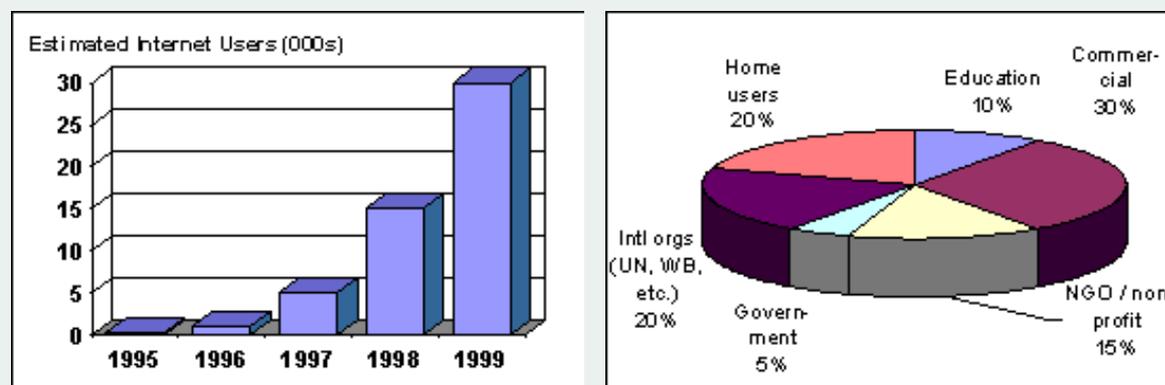
between business subscribers and users can vary tremendously. For example, Health-Net is one subscriber but it has around 500 users.

- The majority of users in Nepal are primarily utilizing e-mail rather than full-blown Internet services.

An estimate of 35'000 Internet users (including e-mail only) in Nepal at the end of 1999 seems reasonable, based on the consensus of various estimates and the mix of home/business subscribers reported by the ISPs. A goal of 100'000 users by the year 2000 has been promoted by the industry. Figure 2.5 shows the growth in estimated users over the

Figure 2.5: Internet users in Nepal

Estimated Internet users by year, 1995-1999, and by Sector, May 1999



Source: Left chart: ITU estimates. Right chart: Network Startup Resource Center as reported by Dileep Agrawal, May 1999.

Table 2.5: International Internet Capacity

VSAT operator / user 1)	Bandwidth	VSAT users (ISP)	Bandwidth
Mercantile	3MB down / 1MB up (via Singapore Telecom -STIX)	HON	128 kbit/s
		CCSL	64+240 kbit/s down / 32 kbit/s up
		Everest	128 kbit/s down / 64 kbit/s up
		NuMedia	n.a.
WorldLink	2MB down / 128 kbs up (via Thaicom)	[own use]	2 MB down planned. Actual down link 512 kbps at January 2000.
C&C	Via Loral satellite	InfoCom	240 kbit/s down / 64 kbit/s up
		HTP	n.a.
		COL	n.a.

Note: 1) These companies have VSAT operator licences and also lease capacity to downstream ISPs in Nepal.
Source: ITU adapted from ISP information.

last several years as well as the mix of users.

One estimate puts the value of the ISP market at over US\$ 1 million for 1998¹⁰; however based on the revenues reported to the regulatory authority of two of the three ISPs that were in operation that year, the figure was closer to US\$ 0.5 million¹¹. No precise figures exist on the volume of traffic generated by Internet use in Nepal. However, estimates based on modem usage extrapolated for the entire industry suggest that dial-up traffic during December 1999 was over 3 million minutes.

A major development for the ISPs was the 1999 government decision to allow them to have their own international connectivity using VSAT technology. This increased international Internet bandwidth from 320kb in May 1999 to over 5MB by the end of 1999 (see Table 2.5). It would not be overstating the case to say that this limited step towards market liberalisation has transformed the market.

2.3 Mass media

Discussion of the Internet takes place in the context of broader infrastructure and social concerns, where significant inequities and disparities may be observed in the availability of services. The Western and rural portions of Nepal are under-served in all dimensions. Electricity has reached only around 15 per cent of the nation, in spite of the availability of free-flowing water for potential power generation. While the overall literacy rate has increased to approximately 40%, there are wide variances by gender, region and ethnic community (see Table 2.6). Newspaper publishing is also highly skewed by region and language (see Table 2.7).

These are not newly discovered or poorly documented problems. Inequity has played a political role throughout Nepalese history, and the value of two-way communication for health care, industrial and construction operations, agriculture, equipment maintenance, and air transport in remote areas was pointed out in a report on radio broadcasting and telecommunications

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25 years ago. Still, Nepal was one of the last nations to begin TV broadcasting and international email, and a 1996 survey found the effectiveness of the Nepalese mass media circumscribed by incapacity to reach remote areas. The same study shows Nepalese media penetration trailing that of China, India, Pakistan and Bangladesh in many ways. More specific findings include:

- Most Nepalese have either no access or have poor access to mass media.
- A substantial portion of the population does not use the national mass media.
- Although the propensity to identify local problems and discuss issues appears to be fairly widely prevalent among the population at large, the ability to draw the attention of the authorities to local needs and problems, and to use the media to publicize them, is limited.

People in the South, East and Kathmandu valley have better access to, and use of, the media than others. The same holds for urban people, men,

young people and those with education, money, and fluency in multiple languages. This history leads us to the question of political will, without which no pilot study or infrastructure investment will be meaningful. There are forces that tend to preserve the status quo in all nations. In some cases, political and economic advantages are protected, and in others alternatives and opportunities are simply not seen.

2.3.1 Broadcasting

2.3.1.1 Radio

Radio Nepal has been broadcasting since April 1951. It uses both Short Wave and Medium Wave frequencies. FM radio, covering Kathmandu valley, was started in 1995. Medium wave transmission, covering between 80-90% of the population, has the widest reach of any mass medium in the country. There are 15 hours of transmission per day including 2 hours of regional programming. Radio Nepal launched an Internet service in 1997 (the web site is <www.catmando.com/news/radio-nepal/radionp.htm>). It is particularly popular with overseas Nepalese. There are plans to expand the service from Nepali and English news to include other programmes and music. Radio Nepal employs around 600 staff.

Table 2.6: Literacy, as percentage of population which is six years and older

	Male	Female	Total
Development Region			
Eastern	54.2	29.57	41.8
Central	50.19	20.75	35.21
Western	58.24	32.82	44.47
Mid-West	46.94	17.6	31.89
Far West	48.98	14.85	31.31
Ecosystemic Region			
Mountains	43.44	13.42	27.73
Hills	61.75	31	45.51
Tarai	45.4	19.92	32.61

Source: Nepal Human Development Report, UNDP, 1998, <<http://www.nepali.net/undp/keydoc/nhdr98/contents.html>>.

Table 2.7: Regional distribution of newspapers

	Nepali	English	Newari	Hindi	Bhojpuri	Total
Kathmandu Valley	102	11	5	2	0	120
Tarai	160	0	0	2	1	163
Hills	27	0	0	0	0	27
Mountain	0	0	0	0	0	0
Total	289	11	5	4	1	310

Source: Aditya, Anand, Editor, Mass Media and Democratization, A Country Study on Nepal, Institute for Integrated Development Studies, Kathmandu, 1996.

2.3.1.2 Television

Television came relatively late to Nepal. Government owned Nepal Television (NTV) began broadcasting in 1985 at a time when there were less than 500 TV sets in the country, used mainly with video cassette recorders or for receiving Indian television programmes. When NTV went on air, with its initial thirty minutes transmission, the number of TV sets increased dramatically.

NTV covers about 42 per cent of the country's population and 32 per cent of the land area. It has ten transmitting stations. It estimates that it has 2.5 million viewers across the country, around 10 per cent of the population. The number of TV sets in Nepal is estimated at around 150'000, making it one of the few countries in the world where television density is lower than telephone density. Two major con-

straints to extending television broadcasting are lack of electricity and the hilly and mountainous terrain. As it would be very expensive to serve the entire country with terrestrial television, the use of satellite is being explored. Funds have been allocated in the 9th Five Year Plan for this purpose. Satellite will also help Nepalese abroad stay informed about what is happening in the country. It is also planned to have a distance education channel.

NTV transmits 61 hours of programmes per week. The mix is 30% news related (including three daily news programmes; one in English); 50% locally-produced and 20% foreign. It has two production studios in Kathmandu. Another one is located in Kohalpur in the Western region and there are also plans to build one in the Eastern region. There is no television license fee system in Nepal. Funding

Table 2.8: Broadcasting indicators

Status in 1999		
Indicator	Value	Source
Population covered	42%	NTV
Land area covered	32%	NTV
Television sets	150'000	ITU estimate. Last available data from UNESCO is for 1997 with an estimate of 130'000.
Televisions per 1'000 inhabitants	6.9	
Cable TV companies	~80	MoIC
Cable TV subscribers	60'000 – 70'000	MoIC

Source: ITU adapted from Sources shown. Nepal TV web site is: <<http://www.explorenepal.com/ntv/main.html>>

2. Information and communication technology status

for NTV comes from the government but as that is insufficient, NTV solicits advertisements and also sells its locally produced programmes (particularly documentaries) to overseas broadcasters. NTV has around 300 staff.

In addition to NTV there are two private television channels broadcasting in Kathmandu. There are also around

80 cable television companies operating in the country. A license is required from the MoIC. The largest is Space Time Network. There are an estimated 60'000 – 70'000 cable television subscribers. There is little talk about using cable television infrastructure for either telephony or Internet access (through cable modems).

⁵ The text of which is available at: <<http://www7.itu.int/treg/legislation/nepal/law.htm>>

⁶ <<http://www.fncci.org/fncci/text/imother.txt>>.

⁷ There is some controversy that computer importers are being overcharged for taxes. See Source: "VAT and the IT Inedustry," by Prakash Khanal. In, PC Quest Nepal. 10-13th April, 1998. Kathmandu, Nepal. <http://www.panasia.org.sg/nepalnet/economics/vat&it_industry.htm>.

⁸ See IT Nepal Message #12. <http://www.listbot.com/cgi-bin/subscriber?Act=view_message&list_id=it_nepal&msg_num=12&start_num=13>.

⁹ Although NTC does not currently provide ISP service to end users, it had been active providing the backbone international link until the VSAT market was liberated in 1999. As the incumbent PTO, it is free to provide any telecommunication service without applying for a license.

¹⁰ "Internet users and organisations in Nepal handed over more than \$1 million to their ISPs last year - a figure that could go as high as \$5 million by 2001." See Vivek S. Rana. "Internet War: The on-line corporation. Choosing the right Internet Service Provider." *Cyber Post*. Kathmandu, Wednesday September 29th, 1999. <<http://www.nepalnews.com.np/contents/fortnightly/cpost/1999/Sep/Sep29/computer.htm>>.

¹¹ The royalties (4% of gross income) paid in 1997/98 were 511 k Rps paid by Worldlink and 384 k Rps paid by Mercantile who, together, account for 64 per cent of the total market, by number of subscribers.

3. Internet and telecommunications

3.1 Role of incumbent telecommunication operator in Internet

The incumbent telecommunication operator, NTC, has thus far played a limited role in the development of Internet in the country. Prior to mid-1999, it had a monopoly on international data connectivity, and ISPs were forced to rely on NTC for their international connections to the Internet. NTC was not very customer-oriented in terms of pricing, bandwidth (only 64 kbit/s links were provided) or service. As a result, several ISPs established their own international gateways when the market was liberalized, obtaining higher bandwidth at a cheaper cost. They also provided upstream connectivity for the remaining ISPs. NTC was left with no customers and this lucrative revenue stream ended.¹²

NTC still retains a monopoly on wired connections, including conventional dial-up telephone lines and leased lines. It provides 64 kbit/s leased circuits to users that want higher bandwidth. Revenues from leased lines were US\$ 740'000 in the 1997/98 fiscal year, up 28 per cent over the previous year. However these revenues are certain to fall, since as mentioned, all ISPs defected from NTC for their international connectivity. As a result, NTC's international leased circuit customers declined from 13 to 9; though it has 23 national leased line customers. Thus far NTC has been unable to provide higher speed circuits. ISPs also claim that NTC is slow to fulfil requests for leased circuits and as a result, a number of them provide wireless leased circuits to their customers. The ISPs also complain that there is a long wait for dial-in telephone lines and that they have to pay a premium to obtain telephone lines. Again, this is a source of lost revenue for NTC

since the dial-up lines generate subscription and traffic revenue. The delay in providing dial-up lines affects the ISPs business and makes their subscribers angry since there is often congestion.

NTC's indifference to the needs of the ISPs would be understandable if it provided an ISP service but at the time of this report it did not. NTC has ambitions to provide Internet services and has set up a New Services Department to handle these kinds of activities. NTC has a 2 Mbit/s VSAT gateway with Intelsat. The direction of NTC's Internet activities is unclear (national exchange, international gateway provision or retail ISP services?). In its latest Annual Report, NTC states it would be "offering Internet service as hub for ISP and for its own internal use...local ISPs can have direct international link via NTC's network at the reasonable rate".

NTC has also had a X.25 / X.75 packet-switch data network (dedicated or dial-up) since 1995. However use of this network is declining. In November 1999 it had 18 subscribers.

NTC has a web site offering basic information about the company as well as tariff and other customer information (<<http://www.ntc.com.np>>).

3.2 Pricing structure for Internet services

The liberalization of the VSAT market and the entry of new ISPs have reduced prices for dial-up Internet access. In January 2000, Nepal had the lowest dial-up Internet tariffs in the South Asia region (based on 15 hours of monthly use, the most common entry level plan in the region: see Table 3.1). Connection charges are, however, relatively high and though usage charges are low compared to neighbouring countries, they still remain

Table 3.1: Internet dial-up tariffs in South Asian countries

Based on a minimum of 15 hours per month of dial-up use, peak rate, US\$, January 2000

Country	ISP	Plan	Hours included	ISP Connection (US\$)	Monthly ISP charge (US\$)	Telephone usage charge (US\$)
Bangladesh	BOL	Asheem	15	\$59	\$31	\$9.97
Bhutan	Druknet	Casual	15	\$34	\$34	\$6.88
India	VSNL	Plan 25	25	\$2	\$10	\$5.50
Maldives	DhivehiNet	Dial-up access	unlimited	\$43	\$21	\$19.29
Nepal	Capital Online	Plan B	20	\$51	\$7	\$4.36
Pakistan	Supernet	Basic 15	15	\$-	\$10	\$8.09
Sri Lanka	Lanka Internet	Classic	11	\$41	\$13	\$4.52
SAARC average				\$32	\$19	9.02

Note: These are the lowest priced plans for 15 hours per month. Extra hours are billed at peak rate. Not including tax. National currency prices are converted to US\$ using 31 January 2000 exchange rates.

Source: ITU adapted from ISP tariff schedules.

beyond the reach of the average Nepali (the annual charge for 15 hours of monthly dial-up use is equivalent to 65 per cent of GDP per capita). Considering the low incomes and the fact that most Internet usage in the country is e-mail, cybercafé and e-mail tariffs may be more relevant. Easylink Cybercafé, for instance, charges NRs. 3.00 / Min (US\$2.62/Hour) for full Internet access. There is a wide range of packages available ranging from per minute charges, to a certain number of hours per month to unlimited access. There are also different packages for different time of day use.

There are no "Internet-friendly" tariff programmes for the telephone usage charge. There is no nationwide dial prefix for Internet access meaning that users located outside an ISP's POP (basically the whole country outside Kathmandu) will incur long distance call charges. Users within an ISP's POP area pay the local call charge¹³; there is no provision for reduced tariffs for Internet access. The ISPs have proposed abolishing Internet access charges and sharing the telephone call charge with NTC. So far, this has not been acted upon.

3.3 Regulatory status of Internet

3.3.1 Internet Service Provider (ISP) market

The ISP market is competitive. Becoming an ISP requires a license from NTA. The term of the license is for five years. The ISP license costs Rs 300'000 (US\$ 4'386). In addition, ISPs must pay 4 per cent of gross revenue to NTA plus contribute 2 per cent of gross revenue to the Rural Telecommunication Development Fund. Eleven ISPs had received licenses by January 2000. ISPs are allowed to provide their own international gateway using VSAT. They must however apply for a VSAT provider license. ISPs using a VSAT gateway must also apply for a user license. Two ISPs (Mercantile and WorldLink) currently provide and use VSAT. Another company, C&C, provides VSAT services to several ISPs.

3.3.2 Top level domain name

Mercantile Office Systems, the country's first ISP, is the administrator for the Nepal country code top level domain (ccTLD, ".np").¹⁴ Registration of a host using the .np ccTLD is free. Hosts can be registered under these

2nd level domains: COM.NP (Commercial), ORG.NP (Organization), EDU.NP (Education), NET.NP (Networks) and GOV.NP (government). In January 2000, there were 405 registrations of which 192 were reachable. In contrast, the Internet Software Consortium reported 290 hosts reachable under the .np ccTLD in its January 2000 survey. There are restrictions against trading in or using known trade names. Although desirable, the .np host does not have to be physically located in Nepal. However, except for large multi-national companies, there must be at least one administrative contact for the domain name in Nepal. All disputes related to the .np ccTLD are to be settled by a court with jurisdiction in Nepal. The growth of .np hosts had been moderate since 1997 suggesting that either most Nepali organizations aware of the Internet have already registered or they are using other TLDs (e.g., “.com”). However the number of hosts almost doubled in 1999 (see Figure 3.1). It should be noted that many, if not most web sites in Nepal, do not use the .np domain name.

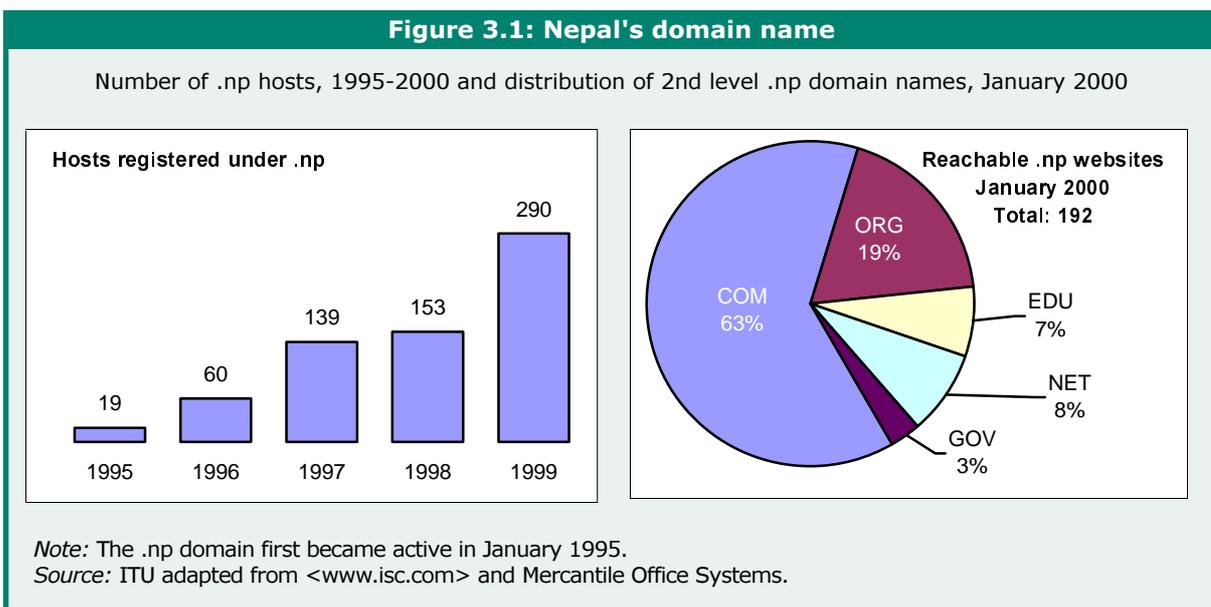
Mercantile has offered to transfer responsibility for the .np domain name to the NTA. Unlike other ccTLDs such as .nu, .to, or .tv¹⁵, there does not appear to be as much “cachet” with .np. Thus, there is little scope for com-

mercialising the .np ccTLD. One exception may be that .np is related to “Nippon”, which may explain why there seem to be a relatively large number of Japanese hosts using .np.

3.3.3 IP telephony

Nepal’s settlement rate for traffic with the US is 84 US cents per minute (as of 6 January 2000), well above FCC benchmarks ITU Focus Group indicative target rates. With BT, the rate is 68 US cents per minute (as of October 1998). However, the international telecommunications arbitrage site, Arbinet (www.arbinet.com), offers as termination rate of just 53 US cents per minute, suggesting there are cheaper ways of terminating traffic in Nepal than via the formal accounting rate mechanism. The high accounting rate certainly creates the incentive for alternative routing. This would seem to explain the recent decline in international incoming traffic from the United States (see Figure 2.6).

One possible way to bypass the accounting rate system is via Voice over IP (VoIP). The formal situation is that VoIP is illegal in Nepal as it is seen as impinging upon NTC’s international voice service monopoly. While the regulator takes a neutral view on the matter, arguing that IP telephony is almost impossible to block. The policy-making body, MoIC, has obliged the regulator



to make clear to the ISPs in the country that VoIP is illegal.¹⁶ In January 2000, NTA was obliged by MoIC to send a notice to all ISPs instructing them to block the Dialpad (<<http://www.dialpad.com/>>) IP telephony service, which offers free calls to the United States. The ISPs duly contacted their user base to inform them of NTA's notice. However, given that Fax over IP is liberalised (requires a license), and that it is virtually impossible for ISPs to distinguish between VoIP and Fax over IP, it would be surprising if the ISPs were able to comply with this ruling. Indeed, some cybercafés openly advertise VoIP on their web sites.

The position that MoIC has taken over VoIP is partly a "moral" one, abiding by the terms of the International Telecommunication Regulations, but also a self-interested one, given the close ties between MoIC and NTC. Ironically, the main usage of VoIP may not be outgoing traffic from Nepal but rather incoming international calls. While it is difficult to obtain concrete evidence, it appears to be the case that some incoming international voice traffic is coming in over the Internet and then breaking out into the PSTN locally. This service is relatively easy to provide now that VSAT data services have been liberalised and more than 5 MB of capacity is available to private ISPs. One contact described being offered tens of thousands of US dollars to host such a service, an offer, which was refused, though others may not have been so circumspect. Given that the lines rented by ISPs are likely to show large volumes of incoming traffic, it would be relatively easy to hide incoming voice traffic, worth around a hundred times more per minute, mixed in with incoming IP data and fax traffic.

Thus the "moral" position on VoIP becomes hard to justify. Why play by the rules when the rest of the world is cheating? Indeed, the "moral" position becomes arguably "immoral" when one considers that by blocking outgoing VoIP while being unable to block incoming VoIP, Nepal is suffering twice over: NTC is losing out on valuable incoming net settlements while Nepalese are losing out on the chance to make low-cost foreign calls.

3.3.4 Universal service / access

Nepal faces an immense task in enhancing access to communications. Overall teledensity (main telephone lines per 100 inhabitants) is just over one, with wide variations between urban and rural areas. Access to Internet is concentrated in the Kathmandu area, with POPs in less than half a dozen other towns. Given the low level of communication infrastructure, it is clear that the country's primary goal should be to ensure widespread access to communications facilities at affordable rates (universal access) rather than concentrating on universal service (provision of communications access to each household).¹⁷

The following universal service goals are stated in the 1999 *Telecommunications Policy* document:

- "To make available the telephone service as per the demand and to provide new and recent telecommunication services in accordance with the demand of the market in addition to the basic telephone service."
- "To make arrangements for making the basic telecommunication services universally accessible to those who do not have separate telephone lines of their own."
- "To make available the basic telephone services in remote and inaccessible rural areas also of the Kingdom."

The government is tackling universal access goals through two main initiatives: (1) Provision of public telephones and (2) the Rural Telecommunication Development Fund (RTDF).

The Telecommunication Policy document outlines three areas of how public telephones will be made more widely available (1) encouraging NTC to further install public telephones; (2) allowing the private sector to operate public telephones; and (3) allowing telephone services to be resold.

There are actually two components to extending access in rural areas. The first is a commitment by NTC to provide at least two telephone lines in each VDC as part of its 'Special Rural Telecommunications Programme.' A second component is the RTDF to which all telecommunication licenses (including ISPs) must contribute 2 per cent of their annual revenue. Additional funds received from the government or international development agencies will also be deposited in the RTDF. As the RTDF has not been used yet, it is

unclear exactly how it will work nor is it clear whether anyone can provide services drawing on RTDF funds or just NTC and the forthcoming second basic service licensee. The Policy document does vaguely state that "the private sector will also be engaged to operate telecommunication services in rural areas." Another clause of the Telecommunication Policy document states that service providers must invest at least 15 per cent in rural locations in the areas they operate in.

¹² It is estimated that NTC made around US\$200'000 a year from its Internet connectivity (8'000 per month for a 64 kbit/s link to two ISPs).

¹³ The first 100 local calls are included with the subscription charge. After that, local calls are charged at Rs 1 per 3 minutes peak time and 6 minutes off-peak time.

¹⁴ Information about registering a host under the .np domain is available at <<http://www.mos.com.np/domains/default.htm>>.

¹⁵ .nu is Niue; .to is Tonga; .tv is Tuvalu. As with several others, these ccTLDs are marketed commercially as they have a specific meaning in English or other languages and thus add a certain "cachet" to a URL.

¹⁶ See "NTA Bans VoIP." *The National NewsMagazine*. January 28 - February 03 2000.

¹⁷ "Soft" factors such as raising awareness of Internet and information technology training are also important for expanding universal access to Internet.

4. National absorption of Information Technology

This chapter explores the use of Information Technology in the government, business, education and health sectors.

4.1 Government

The Nepalese government sees itself as promoting, or directly using, information technologies in the following ways:

Government roles:

- To set national goals and priorities, and to develop policies to achieve them;
- To develop human resources;
- As an investor in R&D and other IT-promoting endeavours;
- To operate or regulate IT-providing organizations;
- To enable and encourage the private sector;
- To provide content and standards;
- To protect the public and national interests.

Direct uses of IT in governance:

- To reach and deal with non-government constituencies;
- To support internal government transactions.

A summary of our findings in each of these categories follows.

4.1.1 Government roles

4.1.1.1 *To set national goals and priorities, and to develop policies to achieve them*

For more than a year, the Government of Nepal has been in the process of developing a comprehensive set of policies dealing with the information technologies. Some of this is explicit in the Ninth Five Year Plan, but most is still under development. Much of the effort appears to be at the initiative of the National Planning Commission act-

ing for the Cabinet, with the Ministry of Science and Technology designated as the lead line ministry. For telecommunications more specifically, the line agencies are the MoIC and the recently established regulatory agency, the NTA.

Two overarching national goals to be served by encouraging the development and use of IT are: (1) the further development of several economic sectors; and (2) improving access and the quality of life throughout the country, and especially in the villages and rural areas, where almost 90 per cent of the population resides. It is hoped that IT will help develop both basic sectors for domestic consumption, e.g., agriculture and electric power, and also help make these and other sectors, e.g., tourism and carpets, into more effective export industries. The plan also calls for the use of IT to improve the quality and range of government functions and services to the people. A major constraint on the implementation of the prospective forthcoming policies is that they should not result in seriously draining the hard currency holdings of the government.

The Minister of Science and Technology (MoST) heads the National IT Policy Committee with senior membership from several other government agencies, including the NPC, the Ministry of Finance, Tribhuvan University, among others, and from the private sector. This committee currently has subcommittees doing policy-oriented studies of the following subject areas:

- Telecommunications Infrastructure;
- Human Resources;
- Software Industry;
- The Internet (especially e-governance, e-commerce, rural access);
- Cyber Laws;
- IT Parks.

4.1.1.2 *To develop human resources*

This subject is discussed under the Education subsection below.

4.1.1.3 *As an investor in R&D and other IT-promoting endeavours*

There has been essentially no government support for IT-related R&D in Nepal. Most of what little that does take place, e.g., some embryonic efforts at Tribhuvan University and possibly elsewhere, is largely in the form of fairly rudimentary development by developed country standards. The Ministry of Science and Technology has recently contributed 10 million rupees to the three major universities in Nepal, and other funds to the Royal Nepal Academy, but none of this supports work in IT. However, the Ministry has stated an intention to support IT-related R&D in the future. There appeared to be no competitive funding mechanism from the government, although Nepal does get some R&D support in other areas from international agencies. Although it remains unclear how much the Ministry of Defence supports R&D in IT, a few years ago, the Nepali government announced the creation of an IT Park, to be located between Banepa and Khulikel. But, so far, almost nothing has come of it. So far, no clear focus for investment in R&D has emerged.

The government could participate as an investor in IT in other ways, ranging from major purchases of hardware and software for direct government use, to direct investment or subsidy in selected IT areas. As a prospective matter of policy, the government has expressed interest in investing in IT Parks to develop a software industry, and perhaps a modest hardware industry producing inexpensive Internet terminals. The government is also uniquely capable of spending large quantities of rupees, especially in the rural areas. To date, as far as it is possible to tell, there have been little of these kinds of investment.

4.1.1.4 *To operate or regulate or license IT-providing organizations*

This subject is covered in Sections 2 and 3 above. However, it should be noted that the registration of .np domain names is not handled by any government agency. At present it is in the hands of the MOS ISP. Serious consideration apparently is being given to transferring that function to a government agency or a neutral private party.

4.1.1.5 *To enable and encourage the private sector*

The government continues to impose fairly high taxes on IT imports, to control the disposition of significant hard currency earnings by the private sector, and to support a monopoly telecommunications operator. However, as discussed in Sections 2 and 3, the government has loosened controls in several ways, and in particular made changes that have resulted in the rapid development of a group of private ISPs. As discussed in Section 3, in comparison with the controls of the past, the NTA is taking a progressive role in enabling private sector initiatives, especially with regard to the Internet.

4.1.1.6 *To provide content and standards*

The MoIC runs the national TV and radio stations and several newspapers. It provides or oversees much of the Nepalese language content in these media. Neither the MoIC nor any other government agency does the same with regard to the Internet. Most of the Nepal-related content on the Internet is in English and either generated abroad or by domestic private sources. In principle, the MoIC still has responsibility for policing illegal content, but the need for this has so far rarely occurred with respect to the Internet (the best known of the few cases involved the morphing of a photograph of a popular actress).

Nepalese is spoken almost exclusively in Nepal, with the exception of some parts of India like Darjeeling, Assam and some parts of Bhutan. It bears a strong relation to Hindi, both

languages are derived from Sanskrit, but differs in significant ways, e.g., it has a different character set for the numerical digits. As is the case with other one-country languages for small countries (e.g., Hebrew, Vietnamese) the standardization of the character set and some grammatical features, especially in *de facto* world standard software products, does not come early or easily, and much of what is done is via patches. So far, the government has not taken a strong role in bringing about an effective standard.

4.1.1.7 *To protect the public and national interests*

This usually takes the forms of laws and regulations concerned with national security, often interpreted broadly to include forms of internal security in developing countries, crime, and economic activities (e.g., intellectual property). Although mentioned on occasion, for example, with regard to Maoist guerrilla groups in western Nepal, national security considerations do not seem to play a serious and visible role in government control. As noted earlier, the Ministry of Information and Communications theoretically enforces certain forms of censorship controls, e.g., on negative coverage of the Royal Family, but there are apparently few cases of this that are prosecuted. The MoIC would work with the Home Ministry for enforcement. The MoIC also assigns wireless frequencies to both the military and civil users, apparently without much conflict.

There is a subcommittee of the National IT Policy Committee studying cyber laws in India, Malaysia, and Singapore with the intent of working out a suite of such laws suitable for Nepal. Some of the issues being considered are said to include digital signature, computer crimes, and contradictions with existing laws. So far, it appears that the subcommittee has not completed its work, and it was not possible to find out what they are likely to recommend.

4.1.2 **Direct uses of IT in governance**

4.1.2.1 *To reach and deal with non-government constituencies*

Some Nepalese Government agencies have simple web sites. Most apparently do not, as there are only 12 .gov.np domain names registered as of January 20, 2000 and the majority of these do not have associated web sites. Those that do have web sites include the NPC and the national police. There seems to be no Internet presence for Parliament and local government. However, some government agencies maintain web sites on .com servers, including Radio Nepal and the Ministry of Home Affairs.

Evidently, it is hard to know to what extent these sites are used by the Nepalese people, but one can assume that they are not used extensively since only a small fraction of people in the country have Internet accounts, and those were spoken with did not seem to use government web sites extensively. Some Ministry Secretaries who were contacted did not even know if their ministries had web sites.

The government provides almost no on-line content or systems support for public use of the Internet in governance-related subject areas such as news, weather conditions, public meetings, agricultural commodity prices, legislation before Parliament, reference data bases for legal codes, etc.

There is a subcommittee of the National IT Policy Committee concerned with e-governance. At the time of the writing of this report, their deliberations and recommendations had not been made public. The indication is that e-governance in the strong sense of direct reach to and feedback from citizens is a long way off because of the limited supporting infrastructure for electrification, education, and telecommunications.

The two government agencies most likely to be most advanced in the use of IT for dealing with constituencies

outside of the Nepalese government itself appear to be Civil Aviation, and the Foreign Ministry. The Ministry of Tourism and Civil Aviation operates the civil aviation infrastructure, and thus likely operates information systems that must interface with all private domestic and foreign airlines. Apparently, the Foreign Ministry operates a secure network that connects all the Nepalese diplomatic missions abroad, but there are no available details. It is possible that such a network might be selectively used by Nepalese businesses¹⁸.

The Nepalese Government, through the NTC, has had a policy of promoting at least a minimal telephone presence at the district and village level. While this is not necessarily for government-citizen connections (government-government and citizen-citizen conversations are probably at least as likely), it does represent an effort of government to get some telecommunications to the remote areas either through Public Call Offices or via a direct presence in government offices (see discussion in section 3.3.4).

It is difficult to tell if there are any specific government agencies that are seriously wired into specialized international networks.

4.1.2.2 To support internal government transactions

Most ministries are very probably better equipped with telephones compared to the rest of Nepalese society, and most of these phones are used for communications internal to each agency and for communications elsewhere within the government. Yet, it is difficult to tell whether telephone presence declines through the government and national geographic hierarchies (e.g., measured by distance from Kathmandu).

No government agency appears to benefit from a packet-switched Intranet that extends broadly within the agency and with an international gateway. The most likely agency to have such a network would be the Foreign Ministry.

All available information indicates that the Ministry of Defence (MoD) does not have a visible presence that either supports a larger national network, or constrains communication, as for example, the MoD does with its control over wireless communications in India. If there are MoD controls over telecommunications, they may be in the remote and especially border areas, as well as areas where Maoist guerrillas are active.

The Ministry of Science and Technology has a stated intention to provide Internet connectivity for much of the Nepalese government. The network would extend down at least three levels in the government hierarchy: to ministries, departments, and offices.

So far, the intention is for the Ministry to have a VSAT (they have had one since November, but it was not operational in mid-late January), and to provide Internet connectivity via dial-up. More remote areas would be connected via radio modems, the Ministry intends to run the network itself, using personnel who until recently worked for private ISPs. No government agency would be required to use this network, and all using agencies would be expected to at least partially pay for their use. There is, at present, no specific plan to physically wire up an Intranet for the huge government complex at Singh Durbar in Kathmandu.

At this time, it would seem that the Ministry intends to act as a minimalist government ISP. There does not appear to be a serious interest on the part of the Ministry to provide other services, like web site construction, and no intent to build a network that would be secure enough and otherwise capable of handling government-government or government-business procurement. Nor are there any specific plans to promote use of IT by local government.

4.2 Business

The use of the Internet by Nepalese business is in early stages due to Nepal's relatively late start on the Internet. In most nations, the Internet

4. National absorption of Information Technology

was first established by small groups of enthusiasts in the university and research community,¹⁹ but that was not the case in Nepal. Commercial organizations led the way there, but they were late. By the time that Nepalese companies began experimenting with store and forward (UUCP) email service in 1994 and 1995, most other nations already had full IP connectivity, commercial Web services were being deployed,²⁰ and an international conference had already convened on the role of the Internet in tourism, an important business in Nepal.²¹ As a result of this late start, Nepal finds itself with a relatively immature commercial Internet industry and presence.

MOS is the oldest Nepalese ISP, and appears to be the leading business connectivity provider. They have between 20 and 30 leased line customers and roughly 80 per cent of their dial up accounts are businesses. MOS is also doing off-shore programming for Bloomberg Financial Services, and is developing an online retail mall, which will be integrated with back-end processing for ordering, inventory, fulfillment, etc. They also have a 10-person news-gathering organization, and produce www.nepalnews.com. This site has approximately 4'000 visitors per day, and is a potential source of revenue domestically and among the Nepalese expatriate community (some 80 per cent of the visitors to the site are from North America).

Nepal's late start with the Internet has left it with relatively little business activity. Table 4.1 summarizes the listings of tourism and export related companies in the Nepal Directory, which is available both as a hard copy Yellow Pages and online. Even in these export-oriented industries, only 49% of the companies listed in the Yellow Pages have email addresses, and many fewer have web sites.²² One problem is the sheer number of online directories for Nepal. In fact there are so many, they have run out of original names (e.g., www.catmando.com). Most only list the organizations they host. It would be useful and reassuring to have an officially sanctioned

"Nepal web site" (like Singapore's national web site, Infomap <http://www.sg>). This is especially true for sites such as government agencies (again see The Singapore Government web site at <http://www.gov.sg>).

Looking at the web sites that do exist, one sees further evidence of Nepal's late start on the Internet. They are first generation web sites — small, static sites typical of the early "electronic brochures" that were found on the Web several years ago in all nations. They will evolve with time, but they are dated. Dhukuti.com, www.dhukuti.com, is an improvement over most of these sites. It is a US-hosted site selling books, music, handicrafts and booking travel and trekking tours that was built with table-driven store package. It has the look, shopping cart, credit card verification, and site evaluation feedback that US shoppers are familiar with today, and access in the target market is fast because it is hosted in the US. Modern web sites are comprehensive, providing all the information and service a user requires. They are interactive, allowing the user to customize the experience, retrieve material from and update databases, complete transactions and payments, arrange for fulfillment, etc. They gather information from users, leading to effective customer relationship management and the possibility of creating a community among the users themselves. They also provide views of corporate information for and communication with suppliers, vendors and other business partners.

For example, a mature travel presence could provide one-stop information for potential visitors. It would gather valuable data on visitors to the site, and provide a customized experience for different types of traveller (business, general tourist, Buddhist tourist, rugged trekking, mountain climbing, etc.) from different parts of the world. The system would be comprehensive, covering the travel experience from basic familiarity with options through visa application, airline reservations (international and domestic)⁵, ground transportation, hotels and lodging, guides,

etc. The site would be interactive, allowing for online itinerary configuration, reservations, and payment. The site in such a system would be the tip of the iceberg; it would be well integrated with systems for fulfillment. A visitor's records and itinerary would be online for access by the people responsible for meeting them at the airport through the people responsible for dropping them at the airport for departure. Equally important, the system would be database driven so providers of services could maintain prices and other information independently (it would not scale without such decentralization). There would also be mechanism for assessment and evaluation of services, perhaps a combination of association inspection and customer feedback. There would be follow-up with site visitors and community building for those who have visited Nepal, leading hopefully to a long run relationship with these customers.

It is clear that such a system would require a significant effort, perhaps encouraged and coordinated by the Nepal Tourism Board. It would also require nationwide connectivity, perhaps focused on district capitals or airports (there are 44 airports in Nepal). Whether in tourism or other industries, Nepalese business should, and will begin developing comprehensive, modern web sites.

4.3 E-commerce

Electronic commerce (e-commerce) is growing rapidly and fuelling investment, productivity increases and economic growth. However, the vast majority of that investment and return has taken place in developed nations, and the role and impact of e-commerce on developing nations is unclear. One must ask whether a developing nation can afford to allocate scarce human and economic resources to e-commerce based on the hypothesis that it will pay off.

There is reason to believe it will. For example, the World Bank found rates of return between 13 and 20 per cent, averaging about 20 per cent, when assessing telecommunication invest-

ments in developing nations.²⁵ In addition to return on investment, they estimate a 15-30 per cent return to the general economy. They also find "very large economic returns" from the telecommunications components in other sectors such as railways, power, tourism, banking, and rural development. These returns were seen before the value of Internet-based e-commerce was added to basic communication investment. A recent report of the United Nations Conference on Trade and Development (UNCTAD) describes e-commerce progress in developed and developing nations in an attempt to instil confidence in leaders and decision makers so they will act to gain experience in this area.²⁶ A study of 74 garment manufacturing firms in Delhi concluded that they "should adopt the latest information technology tools available in the world market."²⁷

Other scholars, for example, Ernest Wilson, are less confident;²⁸ however, no prudent government can ignore e-commerce. It would be wise to investigate and gain experience rather than sit on the sideline waiting for the impact to become known with certainty. Practical suggestions for governments including spreading awareness of e-commerce, developing human resources (user, entre-preneurial and technical), developing local content, facilitation of financial services, planning telecommunication infrastructure, encouragement of value-added telecommunication services, facilitation of online payment, reducing costs of equipment, and passing laws to facilitate e-commerce are outlined by Dessauer and Ismail.²⁹ Many governments, including that of neighbouring India, have mapped out active policies and programmes in and in support of e-commerce.

While the government of a developing nation should investigate and invest in e-commerce, it must do so in the context of its own goals and situation. In a developed nation, e-commerce might be viewed as a means to increased industrial productivity or export expansion. While these are important everywhere, a developing

Table 4.1: Comparison of printed and online version of Nepal Directory

By selected listing category								
Listing Category	Print (Kathmandu)				Online (National)			
	Nbr.	Email	%	Web	Nbr.	Email	%	Web
Cargo Clearing & Forwarding	156	94	60%	0	30	25	83%	0
Exporter & Importer	363	120	33%	0	11	8	73%	1
Airline	65	26	40%	3	57	22	39%	0
Hotel ²⁴	300	136	45%	7	21	20	95%	1
Travel Agency	387	216	56%	1	32	27	84%	1
Trekking	295	195	66%	3	41	31	76%	2
Total	1'410	693	49%	14	162	108	67%	5

Source: Nepal Business Directory 1999/2000 <<http://www.nepaldirectory.com>>.

nation might be more concerned with stemming population flight from rural to urban areas by increasing village productivity to the point where it affords two rather than one meal per day or providing access to news, entertainment, and education. The Nepalese goals of increased social and geographic equity and rural employment should be considered along with economic considerations in e-commerce decision-making. The remainder of this section will examine various ways of viewing and categorizing e-commerce, with comments on the Nepalese context, and conclude with brief discussions of projects that might be undertaken.

4.3.1 Views of E-commerce

Like the proverbial blind men and the elephant, there are many ways to define and categorize e-commerce. Rather than attempt a single, orthogonal taxonomy, one must look at the e-commerce "elephant" in several, overlapping ways, discussing information products, electronic markets, vertical industry portals, extranets, business-consumer systems, and e-commerce involving government.

Information Products

Information products are unique in that selection, transaction, payment and fulfilment may be completed electroni-

cally without involving physical infrastructure for warehousing and delivery. Information products would seem attractive in a developing nation like Nepal, where roads, transport, post and delivery facilities are poor. On the other hand, the banking and legal system must provide for electronic payment, and, of course electrical and telecommunication infrastructure must be available and reliable.

In considering information products for export, one should ask what is uniquely Nepalese. What news, literature, music, images, and video content would have a market? Who would be the audience? Nepalese expatriates? English and Hindi speaking Indians? An e-commerce presence could perhaps evolve out of a government sponsored Nepalese culture site on the Internet.

Software and data entry are another form of information product. This can take several forms.³⁰ At the low end remains the relatively unskilled transcription and data entry. More highly skilled content creation, for example, drawing for animation, the creation of web sites, or the operation of remote call centres are also possible. Contract programming, in which a programmer either works at the client site or works remotely communicating over the Internet, is common practice as well. Each of these examples entails

selling people's time, but software products like a vertical system for an industry or application or other packaged software can also be exported. India has made notable progress in this area but they have spent many years developing skills and business partnerships. Only two such relationships were found, MOS' work for Bloomberg Financial Services and work on Pilgrim Software's Quality and Manufacturing Integrated System by Pilgrim Asia, <www.pilgrimusa.com/asia_rd.htm>.

Of course the Internet merely enables or facilitates such activity – management, marketing and human capital are at its core. The markets for this sort of service are very competitive and crowded, making differentiation difficult. One strategy is to focus effort on areas of current competence. For example, Chilean banking and forestry software was successfully exported because they had developed excellent local systems, and Nepal may have expertise in other areas, for example, in systems for electrical power generation and distribution.

There would also be a domestic market for information products if there were infrastructure in place to deliver them. Information products involving credit, education, news, health, entertainment, and personal communication can be sold in rural and in urban areas if people have access to a network connection or a telecentre. For examples of a number of demonstration projects, see the Rural Applications Focus Group of the International Telecommunication Union, <www7.itu.int/itudfg7> and the Telelac project in Latin America, <www.tele-centros.org>. While many projects are in the pilot phase, the technology to support such applications is improving rapidly.

Funds transfer is another information service. The Internet is increasingly used by expatriates in developed nations to maintain contact with each other and with their families. Expatriates often send funds or funds to purchase gifts home, and a trustworthy

mechanism for electronic funds transfer should be provided. The same service is needed to support export business. This should not be seen as a profit opportunity for the government, but as a method of getting hard currency and enhancing quality of life.³¹

Electronic Markets

Electronic markets have flourished on the Internet, and can take several forms. Electronic auctions were devised for consumer transactions but they are increasingly used by business when companies have surplus items to liquidate. The tender model, in which a consumer requests bids for a good or service is common practice with government procurement, and has also been used on the Internet. Other sites allow buyers to make offers for goods and services. In the case of fungible, homogeneous products like grain or securities an electronic exchange can allow immediate consummation of transactions at then current prices. If electronic markets are not established by private companies, the government can take a role by procuring their establishment or encouraging or subsidizing their establishment by private firms. The government would generally not be involved in control or operation of the market site, but in planning, initial financing, monitoring quality, etc.

Electronic markets are well suited to homogeneous, fungible commodities, several of which come to mind in the Nepalese context: electric power, agricultural inputs, products, and transportation, and handicraft raw materials.

Nepal has knowledge of energy markets because of its hydroelectric power industry. We are seeing the emergence of electronic markets for energy, for example, Altranet (<www.altranet.com>), in developed nations today, and Forrester Research predicts that 17 per cent of US electricity will be traded online by 2004.³² Is there a place for an international electronic market for energy in the region? Or, more generically, how can the Internet be used in service of the region's energy suppliers?

Perhaps electronic markets could play a role in rural agriculture by lowering the cost of seed and fertilizer, helping farmers find the best prices for their goods, and finding cheap, reliable transportation to markets. An early study along these lines in Pondicherry, India, found that information about something as mundane as bus schedules and the availability of space on a bus can be quite valuable in the rural economy.³³ One can imagine a Nepalese "Federal Express", which uses information about produce that is ready to go to market in order to aggregate goods for transportation to market places. This would reduce the burden of travel to the market with one's goods.

Handicrafts are also significant in Nepal's rural economy, employing an estimated 300'000 people throughout the country.³⁴ In urban areas, people usually work full time in handicrafts, whereas it is typically a subsidiary occupation in rural areas. While the contribution of handicraft exports to GDP is only 0.89 per cent (1996/7), it has grown steadily from 0.08 per cent in 1986/7, and handicrafts accounted for 4.17 per cent of exports in 1996/7. Might electronic markets for handicraft raw materials and products increase efficiency? As with electric power, these markets could serve the entire region, not only Nepal.

Vertical Industry Portals

In electronic marketplaces, the web site performs the role of a broker, bringing a buyer and seller together at a given price, and providing the mechanism for consummating a transaction. Another possibility is the vertical portal, a site, which describes and indexes the vendors of a given good or service, and provides links to them for interested customers. The transaction is then negotiated independent of the electronic marketplace. As with electronic marketplaces, the government can encourage the establishment of vertical portals if private industry does not do so. Again, it is not suggested that the government should operate and control the site, but simply facilitate its creation, whereby responsibility for content would be

decentralized, and the organizations offering goods and services would provide and maintain their own material.³⁵

The tourism and trekking industry is a candidate for a vertical portal. The web site should be comprehensive, providing for selection of transportation to and within Nepal, accommodations, guides, etc. The site would provide descriptions, search and selection tools, and links to competing companies in each of these areas, necessitating the participation of representatives of several industries. As with most e-commerce, the web site would be only the tip of the iceberg. Payment and fulfilment must also be provided for. Credit cards are the most common payment mechanism for consumer goods on the Internet today, and a means of accepting credit card payment would be necessary. Similarly, systems for international travel, visa and immigration matters, local transportation, and housing would all have to be integrated.

The Handicraft Association of Nepal has the beginning of a vertical portal at <www.nepalhandicraft.com.np>. This site has links to twelve member home pages and an email ombudsman service to match suppliers with foreign distributors, but the site is disappointing. The most important feature to a prospective retailer is the ombudsman service, which, inexcusably, leads to a broken link. There is very little background information, and what is there is graphically unattractive and the text is in poor English. Like a consumer-oriented travel portal, such a site must be comprehensive. It should provide extensive background material on products, terms, customs procedures, shipping and warehousing options, sales volumes, etc. As with other products and markets, a vertical portal could serve the region, not just Nepal. For example, one could focus on Thangka painting, and provide a comprehensive portal for organizations producing them throughout the world.

Extranets

Electronic marketplaces and vertical portals are open, hoping to attract all buyers and sellers, but the Internet is

also used to create closed “extranets” to facilitate communication and cooperation between relatively stable business partners. For example, the handicraft industry involves raw material producers, individual artisans, producer and craft-based organizations, marketing and fair-trade organizations, commercial buyers and importers, government customs and export regulators, retail outlets, and warehousing and transportation at every step in the process. Simply connecting the appropriate people in each of these organizations with email would no doubt increase production and logistic efficiency. Providing them with web sites for querying inventory status, ordering, scheduling, tracking shipments, etc. would provide still greater returns.

Business to Consumer

With the exception of tourism, we have focused on business to business (B2B) e-commerce. The domestic consumer market is limited by the number of Internet users in Nepal and their concentration in Kathmandu. It will be some time before the domestic consumer market is large enough to support business to consumer (B2C) e-commerce; however, entrepreneurs like Mercantile are already considering entry. Their task will be simplified by most delivery being in Kathmandu and other urban areas.

Direct Internet sales to export customers are difficult because of logistical problems with rapid, reliable delivery; however, the inefficiencies and mark-ups in the current distribution channels make direct marketing an attractive goal. For example, a Dhaka full pattern shawl begins with Rs 175 for yarn and Rs 275 for the producer’s labour, and ultimately sells for Rs 5’250.³⁶ An allo placemat, which sells for Rs 300 begins with Rs 15 for material and 7 for labour. Note that the bulk of the export mark-up is in freight, duty and retail. The Rs 5’250 shawl sells for only Rs 750 domestically and the placemat 48.50.

Direct marketing to consumers would entail a web site, and it should be com-

plete and professional, enabling the consumer to select or design, order, pay for and track delivery of an item. Timely delivery to customers would entail warehousing and fulfillment centres in target market areas such as North America, Europe and Australia.³⁷ Government cooperation in streamlining export procedures and lowering duties would also be necessary.

If analysis shows the logistics of direct distribution are economically advantageous, there is still the strategic problem of handling channel conflicts. If direct sales are significant, they will weaken and antagonize current distribution and retail partners. This is a common problem—the same thing happens when a handicraft producer sells directly to a marketing organization or retail outlet, bypassing the local producer’s cooperative or when an automobile manufacturer sells directly to a customer, bypassing the retail dealer. Logistics and channel conflicts are formidable hurdles, but the cost of the current distribution system might provide sufficient incentive to overcome them.

It should be noted that a valuable by-product of all forms of e-commerce, especially business to consumer, is the opportunity for establishing and maintaining a customer relationship. We see firms in developed nations literally paying people to become customers on the theory that it is important to build a brand presence and that it is cheaper to keep an old customer than to attract a new one in a mature market. As such, one of the key functions of a web site is to gather data on visitors for subsequent communication, service and marketing. This should be done unobtrusively, with guarantees of privacy, and always for a purpose or in return for something. It is also necessary to integrate Web data with data gathered by other means. For example, records generated by a tourist and information gathered during a visit to a tourism web site should be integrated.

While this is easily achieved through direct business-consumer e-commerce sites, it is not the only possibility. Many

manufacturers register customers who are sold and serviced through distribution channels, and this could be done for expensive goods such as jewellery and pashmina garments as well.

E-commerce Involving Government

Both local and national governments are also involved in commercial transactions, and the government has an opportunity to lead by example in this area. The Internet can be used in the tender and fulfilment process, project management and reporting, in collections and procedures, etc. These can be both government-business and government-consumer transactions, and there are many examples to follow, for example, in local government in India³⁸ or at the national level in the US or Singapore.

4.3.2 Possible actions

The following suggestions are three possibilities for some concrete e-commerce projects: implement a consumer-facing e-commerce pilot project, convene a series of e-commerce workshops, or conduct a village networking pilot study.

Handicraft E-commerce Pilot Project

This project would market thangka paintings via the Internet. It would generate hard currency and employment, with the possibility of converting some rural labour from supplemental to full-time work. Thangka paintings were selected because the cost and difficulty of shipping them is fairly low relative to their value, they have a long shelf life and present an opportunity for customization. They would have a market as art, decoration or as religious objects, and this diversity provides a degree of stability. Pashmina shawls or garments also share these characteristics, but that is a larger, more volatile industry, hence less suitable for a pilot project.

Savings from reduced distribution and retailing cost would be used to directly benefit the producers by paying over the usual rate, while demanding high quality. Another alternative would be to give the producers an equity stake in the enterprise via Grameen-style micro finance.

There would have to be a purchasing or screening agent in Nepal to insure quality and coordinate logistics. Uniformly high quality would be critical.

Internet customers should be able to select/design paintings or specify characteristics they are looking for and get suggestions. The site should also provide educational material on the meaning and assessment of thangka paintings and the culture surrounding them. There should be framed and unframed options, with a selection of frames on the site. Custom framing should also be available. Payment would be via credit card.

Development of the web site and its marketing plan should be done with a local-market partner with skill in Web design and marketing. This could either be on a profit making basis or not-for-profit through a university or other non-profit.

Timely, accurate fulfilment of orders would be critical, requiring shipping from warehouses in local market areas. Delays due to export bureaucracy would have to be eliminated, and a fast, reliable mechanism for transferring payment from the market area to Nepal would be needed. Since the largest export market area for handicraft is North America,³⁹ and English is used in the United Kingdom and Australia, the United States would seem to be a reasonable location for initial distribution with English the initial web site language.

Vertically Focused E-commerce Workshops

The government could convene a series of workshops bringing together members of the Nepalese IT community and members in industries, which may be likely e-commerce candidates. The goal here would be to educate both communities, leading to innovation and concrete action. Candidate industries would be tourism, electric power and handicrafts. (The latter could be further focused on, for example, pashmina raw material or finished goods).

Each workshop would be comprehensive. For example, a handicraft workshop would include representatives of raw material, producing, marketing, retail and export organizations. The goal would be interchange of information between the IT and other industry attendees followed by preliminary design of e-commerce systems. The workshops would focus on developing concrete plans for increasing efficiency via extranets, electronic markets and vertical portals. The workshops could be tied to government funding as well, in that the best preliminary designs would receive seed funding.

"Village Connectivity" Pilot Project

Village connectivity projects are underway in many nations, and given its social goals and growing urban population, Nepal would benefit from experience in this area. The project could be funded from the telephone rural development fund. Such a project would provide practical experience with e-commerce technology and applications in rural areas, and would hold the promise of improving quality of life and discouraging movement to urban areas.

Prior to embarking on such a project, there should be a survey of similar projects and available technology. There is considerable relevant experience and information nearby in India.

4.4 Education

For the education sector,⁴⁰ use of the Internet is embryonic at best, and this in only a few places. It is almost non-existent in the great majority of educational institutions. Only 27 of the 400 .np domain names registered in January 2000 were .edu.np. A good portion of these were not operational or were not actually educational institutions (although individual educators and some educational institutions have Internet access via non-.edu.np sites). The educational sector has been much more of a follower than a leader in establishing the Internet in Nepal.

4.4.1 Primary and Secondary Schools

There is almost no presence of the Internet in the public elementary and

secondary schools of Nepal. Some computer training takes place in a very small number of private schools at these levels, and some even have their own edu.np domain names (e.g., bhanusecondary, britishschool), but these cater largely to foreigners, the English-speaking and the wealthy.

4.4.2 The Universities

Tribhuvan University (TU) (<http://www.panasia.org.sg/nepalnet/education/Tri_university.htm>) system is by far the largest tertiary education entity in Nepal. It is an extensive national system with 61 constituent and 157 private affiliated campuses around the country⁴¹. Approximately 150'000 students are enrolled, although perhaps 50 per cent never graduate.

The only parts of TU to offer serious education in IT are three of the nine institutes. These include the Institute of Engineering (IoE), the Institute of Science and Technology, and the Faculty of Management. These are headquartered in Kathmandu, with branches at a small number of other campuses. The IoE has established baccalaureate programmes in Computer Engineering and Electrical Engineering, and the Institute of Science and Technology has one in Computer Science. The two explicit "Computer" programmes were created only within the last 2-3 years. Each of the three programmes is graduating 20-50 students per year. The Faculty of Management does not have a Management Information Systems (MIS) degree program, but teaches about a half dozen MIS courses as components of other business programmes, including a Masters of Business Administration (MBA). All three faculties plan on creating additional IT-related degree programmes at several levels, including two Masters programmes in Engineering and a PhD program in Computer Science. However, as things now stand, the TU undergraduate degrees appear to be at the level of 2-year associate degrees in the United States or the equivalent of 2-years of study at a British university.

The IoE has recently established a Centre for Information Technology at its

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campus near UNDP in Kathmandu. This is likely the most technically advanced computer network facility in Nepal. They have a VSAT running with a 64k uplink and 128k downlink to ThaiCom. This VSAT is under the Ministry of Environment and Physical Planning, but IOE has its own application pending with NTA. It is their initial intent to connect approximately 400 machines in nine buildings, each with its own hub. They then hope to expand their network to all four IOE campuses and eventually to all of TU. There is some thought of eventually also providing networks to parts of the government.

All three programmes are extremely limited in faculty, with only two professors each in Engineering and Computer Science, and none in Management. The three faculties have a total of three readers (approximately associate professor equivalents) between them. The great majority of classes are taught by lecturers and instructors. It is difficult to find, hire, and retain faculty. There are no salary differentials by field at TU, and salaries are very low. Teaching loads are heavy and the TU bureaucracy sometimes difficult. Faculty are forced to moonlight on better paying jobs. TU is minimally competitive in attracting and retaining Nepalese who have obtained advanced IT degrees from abroad.

TU also suffers from severe shortages of computer equipment. No campus

has enough machines. At many campuses, very few students have any access. The Faculty of Management has Information Systems labs at a half dozen branch campuses, with roughly ten personal computers at each. With few exceptions, the academic computers at TU are not networked in any way. The major exception is the IOE Centre for Information Technology. Much of the equipment was provided by a World Bank loan. They also have funding from the Canadian International Development Agency.

Some computer courses are offered to students in other disciplines at TU, primarily at the main campus at Kirtipur. The TU administration at Kirtipur also has a small LAN, but it is not clear if it is extensively used, and it apparently does not have an Internet gateway since none of the most senior administrators have an e-mail address on this network. The HealthNet project is under the TU Institute of Medicine (see the section below on the Health Sector).

At least two other universities have college-level IT programmes. Kathmandu University (<<http://www.panasia.org.sg/nepalnet/ku/home.htm>>) (the School of Management also has a web site: <<http://www.kusom.edu.np>>) may be graduating 40 students annually. Several people believe that Kathmandu University has the best tertiary degree

Table 4.2: Schools in Nepal, 1996

Schools Teachers and Students Distribution

Type of school	No. of schools	Students		Teachers		Stud./ Sch. Ratio	Stud./ Teach Ratio	Avg. Class size
		Total	Female	Total	Trained			
Primary	22'218	3'447'607	1'401'346	89'378	39'980	155	39	31
Low. Secondary	5'506	791'502	300'807	19'704	6'204	144	40	48
Secondary	2'903	329'833	119'102	16'423	7'328	114	20	57
Total	22'372	4'568'942	1'821'255	125'505	52'512	204	36	36

Source: UNDP Nepal (<<http://www.undp.org.np/keydoc/nprofile/education.htm>>).

programmes in IT in the country, and offers the only under-graduate programmes that provide more than the equivalent of a 2-year US community college degree. The Kathmandu School of Management is said to offer a good MIS program within their MBA. Purbancha University is said to be graduating approximately 120 students per year on two campuses. They also have a practical program to produce mid-level software engineers. The program is growing quickly (they accept anyone with a 10+2) and easier to get into than TU.

4.4.3 Vocational Training Institutes

It is likely that most of the practical training in IT is provided by about 600 private vocational institutions. These are seen in many parts of Kathmandu, and to a lesser extent in Pokhara, Biratnager and Birgunj and their environs. They range from very small store-front outfits to large schools like the College of Software Engineering (CSE). CSE claims to graduate 1'000 students per year, mostly from a 2-year Diploma programme. Altogether, these private

schools are said to train 15'000 people per year. Much of this is in the use of established software products such as Microsoft Office. Increasingly, the Web and Internet are becoming parts of these curricula, and perhaps 40-50% of the schools have or are acquiring Internet access. There is some parallel between these schools and those that teach English, and we suspect a strong correlation between English and the teaching of IT-related skills.

The Indian-based NIIT (<<http://www.niit.com/index.shtml>>) is one of the most advanced of the private vocational training institutions in Nepal. It uses a curriculum developed by one of the most dynamic educational institutions in South Asia, which now operates in 15 countries. NIIT offers a respectable range of technically substantive, university-calibre, courses in Kathmandu. Networking appears to be given more emphasis here than at the universities, and they offer contemporary web development courses. Aptech and perhaps a few other Indian educational organizations are also providing some IT instruction in Nepal.

Table 4.3: Schools with web sites, January 2000

School	Comment	Web site
Shree Bhanu Secondary School, Bandipur	There is a home page, but no links were working.	< http://bhanusecondary.edu.np/ >
Graded English Medium School	All links working except one (out of eight).	< http://www.gems.edu.np/ >
Lotus Eyes International School	One descriptive page, no links.	< http://www.nepal.edu.np/ >
Nepal Medical College	Nine out of twelve links working.	< http://www.nmc.edu.np/ >
Nepalgunj Medical College campus is located at Chisapani	All links working, including an online admission form.	< http://www.ngmc.edu.np/ >
Nepal Engineering College	All links working, including printable application forms.	< http://www.nepeng.edu.np/ >
Kathmandu University School of Management	All links working.	< http://www.kusom.edu.np/ >

Note: Only schools using the edu.np domain name.
Source: ITU.

The most visible active computer users in Nepal are seen at registration desks at hotels, and similar places. It may be that much of the basic training for such use is provided in house, or by the vendors of the systems.

4.4.4 Training Abroad

As is the case for many less developed countries, many of the “best and brightest” people go abroad for their education. One estimate is that roughly 100 Nepalese receive bachelor’s degrees from India, Russia, the United States and the Philippines annually. Perhaps a similar number receive advanced degrees each year. More of these people go to India than any other country. The reasons are a combination of proximity, language, cost, and admissions. We suspect that the majority of those who study abroad try to pursue technical subjects, but we do not know what fraction are pursuing the study of the information technologies.

As might be expected, many of those who study abroad, especially in the West, are able to get better jobs there than they could get in Nepal. Many who return apparently do so either because they do not complete their studies, or because of family obligations. However, most who do remain abroad seem to retain very positive thoughts about their home country, and seem to want to help out back home.

Many of the most active people whom we met in Nepal were either at least partially educated abroad, or had spent considerable time there.

4.4.5 Effective absorption of educated people into the society/economy

There are apparently more educated people looking for good jobs in Nepal than there are jobs for them. IT-related jobs in the private sector were often said to attract large numbers of applicants. We suspect that many of the applicants are under-qualified for the best jobs. Senior administrators at TU expressed concern that the government and private sectors were not

generating enough jobs to absorb even their fairly modest numbers of IT graduates. These senior educators did not have much of a concept of IT-educated people creating their own jobs.

Many of the graduates of the private vocational institutions take clerical or operator jobs at government, NGO, and private organizations. Some seek jobs abroad on the basis of their technical skills. For example, CSE claims “several” graduates who have secured jobs in the West. But we suspect these numbers are low, and that most Nepalese who have IT-related jobs abroad received some training there.

4.5 Health

The general state of health care in Nepal is poor.⁴² Although most health indicators have significantly improved in recent years, Nepal still has a long way to go even to reach regional norms (Table 4.4). Furthermore, there are extreme variations within Nepal. For example, average life expectancy was 55.8 years in 1996, but it was only 36 years in the Mugu District and 67 in Kathmandu, and the standard deviation in life expectancy among districts was 6.2 years.

Table 4.5 shows Nepalese health resources. While we did not conduct an exhaustive survey, we were unable to discover many networked applications. We found one hospital, the teaching hospital of the Nepal Medical College with a LAN, but that appears to be an exception.⁴³ Given the difficulty of travel and communication within Nepal, even basic connectivity would have a significant marginal impact. If, for example, all physicians (particularly those outside of Kathmandu) had Internet accounts or all Health Posts had email access, what would be the applications and benefits?

The one organization, which seems to be actively pursuing network connectivity in Nepal is HealthNet, <www.healthnet.org.np>, and we were quite impressed by what they have been able to achieve with limited resources. HealthNet began networking in December 1994 with a FidoNet

link to SatelLife,⁴⁴ <www.healthnet.org>, in Watertown, Massachusetts. Today they are an ISP serving the medical community with ten modems and a 38.8 kb/s radio link to Mercantile Office Systems. They provide approximately 500 users in 134 organizations with the following services:⁴⁵

- e-mail
- list service
- Usenet News (from the Network Startup Resources Center in Oregon)
- FTP service
- threaded discussions
- Nepalese health statistics
- Nepalese Health Science Bibliography
- Nepalese Masters and PhD Theses
- Full text of Nepalese reports and journal articles
- email access to Medline and Popline
- email Web access
- distance education in the use of computers in health statistics and library and information retrieval
- abstracts of articles in the journals in their library (hard copy requests are fulfilled by FAX).

HealthNet is digitizing its library collection for online access, and hopes to do the same for the Nepalese mental health and orthopedic associations as well. HealthNet charges Rs. 6'000 per month, and the Programme Officer, Dr. Pradhan, feels many physicians use

the Internet for personal business like staying in contact with children studying abroad as well as professional business.

Outside of Kathmandu, much medical practice is traditional, though a physician is posted to each District Office. They have some information for traditional practitioners on their server, and charge half their normal rate for access outside of Kathmandu. Between 25-50 per cent of their users are outside of Kathmandu.

Tribhuvan University graduates approximately 30 physicians per year, and they are HealthNet users. They have a 15-workstation LAN, and will soon add 20-25 more in an adjacent building. They would like to install a LAN in a nearby hospital as well. (Two hospitals are developing systems for computerized medical records). Altogether there are four medical schools and one dental school in the Kathmandu area and six other medical colleges in the nation. Four of these are HealthNet users.

Water contamination is a severe problem in Nepal, and they therefore have expertise in communicable waterborne diseases. Because of heavy reliance on wood for heat and cooking, Nepal also has expertise in respiratory diseases. The prevalence of tropical diseases such as malaria has also given them the incentive to develop research and therapeutic expertise in this area

Table 4.4: Selected regional health indicators

	Infant Mortality per 1,000 births	Life Expectancy at Birth (1997)	Doctors per 100'000 People (1993)	Nurses per 100'000 People (1993)
Nepal	75	57.3	5	5
Bangladesh	81	58.1	18	5
Bhutan	87	60.7	20	6
China	38	69.8	115	88
India	71	62.6	48	n.a.
Pakistan	95	64.0	52	32
Sri Lanka	17	73.1	23	112

Source: UNDP Human Development Report, 1999.

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as well. This expertise could be made available to others on the Internet, and HealthNet has a project to put the full text of Nepalese medical journals online.

Initially, HealthNet was heavily dependent upon SatelLife, but it is now approaching financial self sufficiency. It has four paid staff members, and pays Rs. 40,000 per month for the link to Mercantile. HealthNet is located in the Health Learning Materials Centre of the Institute of Medicine at Tribhuvan

University, and the University pays a portion of Dr. Pradhan's salary and provides office space. Dr. Pradhan has proposed expansion, including a new server, router, and faster link to Mercantile. This would enable HealthNet to expand service to Nepal's roughly 1,800 doctors, nursing homes, and medical colleges. He would also like to offer service to the general NGO community, estimated at 8,000 organizations, and feels this expanded ISP could be financially self sufficient.

Table 4.5: Nepalese health resources

	Per cent With:				
	Number	e-mail	Web	Leased line	LAN
Ministry of Health	1	1	No	No	No
Department of Health Services	1	No	No	No	No
Central Hospitals	5	1	No	No	No
Regional Health Service Directorates	5	No	No	No	No
Zonal Hospitals	11	No	No	No	No
Primary Health Centres	120	No	No	No	No
Health Post	736	No	No	No	No
Sub-Health Post	3'187	No	No	No	No
Hospitals	83	10	No	No	No
Physicians	923	200	3	No	No
Staff Nurses	3'925	5	No	No	No
Public Health Nurses	66	No	No	No	No
Auxilliary Nurses	1'496	No	No	No	No
Kavirajs	309	No	No	No	No
Vaidyas	247				
Health assistants	5'295				
AHWS	3'190				
Village Health Workers	4'015				

Source: Healthnet Statistics Nepal, <<http://www.healthnet.org.np/healthstat/healthstat99.pdf>>.

- ¹⁸ As an illustration of this, to get a copy of a visa application form for Nepal on the Web, one currently has to go to a UNDP site.
- ¹⁹ Goodman, S., Press, L., Ruth, S., and Rutkowski, A., "The Global Diffusion of the Internet: Patterns and Problems," *Communications of the ACM*, Vol 37, No 8, pp 27-31, August, 1994 and Press, L., "Will Commercial Networks Prevail in Developing Nations?," *OnTheInternet*, Vol. 3, No. 2, March/April, 1997, pp 40-41.
- ²⁰ Press, L., "Commercialization of the Internet," *Communications of the ACM*, Vol 37, No 11, pp 17-21, November, 1994.
- ²¹ Press, L., "The Internet and the Travel Industry," *Proceedings of ENTER '95*, Innsbruck Austria, January 18-20, 1995. This conference was followed by the founding of a journal, with many of the participants as members of the editorial staff.
- ²² The two directories do not appear to reflect an integrated database in that all print listings are not online.
- ²³ Nepal has very few roads, making domestic airlines an important part of the tourist industry.
- ²⁴ The Ministry of Tourism licenses roughly 650 hotels nationwide.
- ²⁵ Saunders, Robert J, Warford, Jeremy J., and Wellenius, Bjorn, *Telecommunications and Economic Development*, pg. 15-16, The Johns Hopkins University Press, Baltimore, 1994.
- ²⁶ Lanvin, Bruno and the UNCTAD staff, *Building Confidence: Electronic Commerce and Development*, United Nations Conference on Trade and Development, <<http://www.unctad.org/ecommerce/>>.
- ²⁷ Lal, K. *Information Technology and Exports: A Case Study of Indian Garments Manufacturing Enterprises*, Center for Development Research, University of Bonn, August 1999, <http://www.zef.de/zef_englisch/f_publ.html>.
- ²⁸ Wilson, Ernest, *Meeting the Challenges of Internet Inequality*, *OnTheInternet*, pp 26-30, Vol. 5 No. 6, November/December, 1999.
- ²⁹ Dessauer, Mark and Ismail, Magda, *E-Commerce in the Developing World: Plug and Play?*, *OnTheInternet*, November-December, 1999, pp 19-25, 38-39.
- ³⁰ Press, Larry, *Personal Computers and the World Software Market*, *Communications of the Association for Computing Machinery*, February, 1991. Reprinted in Schellenberg, Kathryn, "Computers in Society," 4th Ed., Dushkin Publishing Group, Guilford, CT, 1991. Press, Larry, *Software Export from Developing Nations*, *IEEE Computer*, December, 1993.
- ³¹ The value of increased connectivity with the Nepalese expatriate community should also be considered in assessing the decision to regulate Internet telephony.
- ³² Kafka, Steven J., Temkn, Bruce D., Sanders, Mathew R., Sharrad, Jeremy and Brown, Tobias O, *eMarketplaces Boost B2B Trade*, Forrester Research, February, 2000.
- ³³ Press, Larry, *A Client-Centered Networking Project in Rural India*, *OnTheInternet*, pp 36-38, January/February, 1999, <<http://som.csudh.edu/fac/lpress/devnat/nations/india/pondyoti.htm>>.
- ³⁴ Shahi, Surendra and Kachhipati, Chandra Prasad, *Collective Marketing: The Case of Handicraft in Nepal*, International Centre for Integrated Mountain Development, Kathmandu, 1999.
- ³⁵ Information presented at the site would come from databases, and the vendors would update their portions of those databases via protected Web interfaces. This database driven, multiple-access approach should be used on all web sites.
- ³⁶ Shahi, Surendra and Kachhipati, Chandra Prasad, *Collective Marketing: The Case of Handicraft in Nepal*, International Centre for Integrated Mountain Development, Kathmandu, 1999.
- ³⁷ The numbers of Internet users in India and China growing rapidly, and more direct shipment may be feasible for reaching those markets.
- ³⁸ Press, Larry, Burkhart, Grey, Goodman, Sy, Mehta, Arun and Mittal, Arun, *The Role of State Government in Developing India's Internet*, *OnTheInternet*, pp 35-37, November/December, 1998, <<http://som.csudh.edu/fac/lpress/devnat/nations/india/otigovt.htm>>.
- ³⁹ Shahi, Surendra and Kachhipati, Chandra Prasad, *Collective Marketing: The Case of Handicrafts in Nepal*, International Centre for Integrated Mountain Development, Kathmandu, 1999.
- ⁴⁰ For more background see "Education in Nepal-An Introduction". <<http://www.panasia.org.sg/nepalnet/education/edukatio.htm>>
- ⁴¹ See "Human Resource Development in Information Technology in Tribhuvan University," Tribhuvan University, Kirtipur, Kathmandu, November 1999.
- ⁴² For a brief assessment of Nepalese health care, see *An Introduction to Health in Nepal* <<http://www.panasia.org.sg/nepalnet/socio/health.html>>.
- ⁴³ Rizyal, A., *Medicos and Computers*, *Cyberpost*, <<http://www.nepalnews.com/contents/cyberpost/1998/Dec/Dec30/computer.htm>>.
- ⁴⁴ SatelLife, a non-profit initiative of International Physicians for the Prevention of Nuclear War, is a pioneer in the support of network access to health information in developing nations. They have helped establish HealthNets in many nations. See <www.healthnet.org/hnet/hnet.html> for general information and <www.healthnet.org/hnet/nepal/> for a description of the Nepalese HealthNet. The name SatelLife derives from the early use of a low-earth orbiting satellite for email.
- ⁴⁵ This material is accessible within Nepal, but not all is Internet accessible.

5. Summary and recommendations

5.1 State of the Internet in Nepal

The Mosaic Group, mosaic.unomaha.edu/gdi.html, has developed a framework for characterizing the state of the Internet in a nation. They consider six dimensions, each of which has five ordinal values ranging from zero (non-existent) to four (highly developed). The dimensions are as follow:

- pervasiveness: a measure based on users per capita and the degree to which non-technicians are using the Internet.
- geographic dispersion: a measure of the concentration of the Internet within a nation, from none or a single city to nationwide availability.
- sectoral absorption: a measure of the degree of utilization of the Internet in the education, commercial, health care and public sectors.
- connectivity infrastructure: a measure based on international

and intranational backbone bandwidth, exchange points, and last-mile access methods.

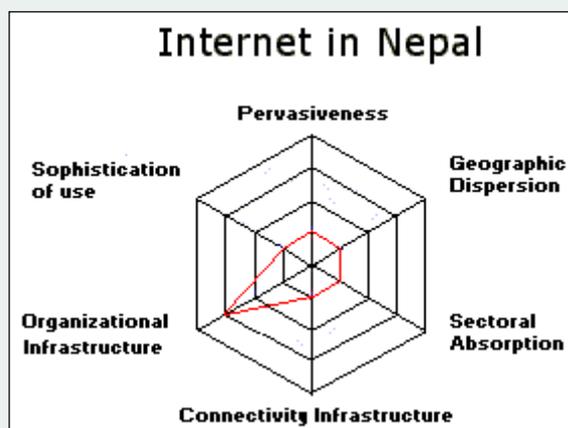
- organizational infrastructure: a measure based on the state of the ISP industry and market conditions.
- sophistication of use: a measure characterizing usage from conventional to highly sophisticated and driving innovation.

A definition of each dimension and its levels is shown in Annex 2, and Nepalese values for these dimensions are shown below:

Pervasiveness is rated as level 1, *Embryonic*. Nepalese Internet use has clearly transcended the technical community, and there are approximately 30,000 users out of a population of approximately 22 million for a user rate of approximately 0.14%. If these were all IP users, Nepal would be ranked at level 2, but many are UUCP users today. (WorldLink, the ISP with the most

Figure 5.1: State of the Internet in Nepal

Dimension	Value
Pervasiveness	1
Geographic Dispersion	1.5
Sectoral Absorption	1
Connectivity Infrastructure	1
Organizational Infrastructure	2.5
Sophistication of Use	1
TOTAL	8



Note: The higher the value, the better. 0 = lowest, 4 = highest.
Source: ITU adapted from Mosaic Group Methodology.

users estimated that 40% of their accounts were UUCP). It is clear that Nepal will rank at level 2 shortly.

Geographic Dispersion is rated between level 1, *single location* and level 2, *moderate dispersion*. While there are points of presence in six cities outside of Kathmandu, connectivity is highly concentrated there. It is unlikely that Nepal will achieve level 2, *moderate dispersion*, for some time, because that would require connectivity in over half of the 75 Districts, and many districts are historically under-served by all forms of infrastructure.

Sectoral Absorption is rated at level 1, *rare*. The ranking is a function of the level of connectivity server ownership in business, government, health care and education, each of which are rated as *rare* themselves. We found very little activity in the health, government and education sectors, so do not expect improvement in this dimension in the near future.

The Connectivity Infrastructure is at level 1, *thin*. There is no intracity domestic backbone, just VSAT connections. (A fiber link is being installed along the East-West road, but it is not yet operational, and, at present, it will

only cover the eastern portion of the road). The sum of all international links is at the low end of the level 2 range; there are no Internet exchange points and nearly all access is by modem over voice lines. A near term increase in this dimension does not seem likely.

The Organizational Infrastructure is between level 2, *controlled* and level 3, *competitive*. There are several ISPs, and no regulatory restrictions on their creation. There is limited competition in the provision of domestic infrastructure; ISPs can provide wireless leased lines for their customers. International connectivity is only available via VSAT, but it is not restricted by regulation.

Sophistication of Use is at level 1, *minimal*. A small user community is using the Internet in conventional applications, primarily email. A good deal of that email is UUCP and Web pages are typically static. We see little or no evidence of altered practices in response to the introduction of the Internet.

This framework has been applied in case and questionnaire studies in several other nations, including some in the region. The dimension values for other nations in the region are shown below for comparison with Nepal.

Table 5.1: State of the Internet in Nepal and neighbouring countries

	Date	P	GD	SA	CI	OI	SU	TOTAL	Source
Nepal	1-00	1	1	1	1	3	1	8	
Bangladesh	3-99	1	1	1	1	1	1	6	M
China	5-00	2.5	3	2	2.5	2.5	2	14.5	M
China	12-98	2	3	2	2	2	2	13	M
India	12-99	2	2.5	1.5	2.5	3	2	13.5	M
India	8-99	2	3	1	1	3	3	13	Q
India	12-98	1	2	1	2	2	2	10	M
Sri Lanka	8-99	2	1	2	1	3	2	11	Q
Sri Lanka	8-98	1	2	2	1	3	3	12	Q
Pakistan	11-99	2	3	1.5	1	2	2	11.5	M

Note: **P:** Pervaiseveness, **GD:** Geographic Dispersion, **SA:** Sectoral Absorption, **CI:** Connectivity Infrastructure, **OI:** Organizational Infrastructure, **SU:** Sophistication of Use. Values range from 0 (lowest) to 4 (highest). *Source:* **M:** national case study, MOSAIC Group, mosaic.unomaha.edu/gdi.html. **Q:** unvalidated questionnaire result, Press, Larry, Second Internet Diffusion Survey, OnTheInternet, Vol. 5, No. 6, November/December, 1999, som.csudh.edu/cis/lpress/gdiff/otidevsnations.htm.

5.2 Recommendations

The following recommendations arise out of the analysis presented above and from experience of similar Internet studies in other countries. They are offered as the basis for further discussion.

5.2.1 Internet-friendly tariffs

The relatively high cost of Internet is a major barrier to Internet diffusion in Nepal. Though the overall cost of dial-up access in Nepal is among the lowest in the region, it is still unaffordable for the majority of the country's inhabitants. The problem is exacerbated by the pricing structure where dial-up calls for accessing the Internet also include local telephone usage charges (after the "free" calls included with the subscription are used up). Furthermore, the concentration of ISPs in Kathmandu means that most people outside the capital would incur long distance telephone charges when utilizing dial-up Internet access.

There are a number of ways to reduce the price of Internet access in order to encourage diffusion. These practices have been adopted in different countries around the world:

- Implement a nationwide dial prefix for Internet access. Calls to this prefix would be charged at a local rate. This eliminates the problem of long distance tariffs for Internet access for users located outside the local calling area of Internet Service Providers.
- Eliminate ISP charges by having ISPs share the local telephone charge with NTC. This is a model pioneered by Freeserve in the UK and now adopted by a growing number of other countries.
- Eliminate or reduce the local call charge for dial-up Internet access.
- Eliminate all charges for dial-up Internet access. This was recently announced by several UK-based companies who plan to earn revenue from other services

(customer's voice calls, advertising, e-commerce).

5.2.2 Full-fledged "Second National Operator"

Nepal is beginning to open and privatize telecommunications, but the current plans for tenders restrict bidders in terms of the services they may offer, the technologies they may employ and areas (international and domestic) they may serve. We recommend that these restrictions be removed. In particular, the fact that the future mobile services operator would not be given an international license will greatly reduce the commitment to invest.

The government should tender for a full-service competitor to the NTC. The tender itself could be an important policy instrument in that it might include conditions that the successful bidder would have to meet. For example, these conditions would spell out the provision of services to remote parts of the country. These conditions might also be applied in a future license for NTC, which should also be made to adhere to the conditions placed on the new competitor.

5.2.3 Government support for Internet businesses

While the Internet community is not looking for any specific assistance from government, there are areas where the government could help to create the right environment for Internet-based businesses to thrive. For example, there could be incentives to help lighten the burden and risk for ISPs, or businesses wanting to do something with the Internet. These might include reducing the levels of taxes and contributions to regulatory and rural development funds, which ISPs are supposed to make, or special dispensations with regard to the use of hard currency earned through e-commerce.

The government also needs to remove impediments in other ways, e.g., make VSAT licenses quick and automatic for just a fee. The government should re-examine the ban on Internet Telephony. This service is inexpensive, a

key factor for promoting communication access in Nepal.

There are no open Internet Exchanges, only loose peering agreements. While the liberalisation of the VSAT market has enabled the ISP industry to grow and become competitive, VSATs remain expensive, and downstream providers are at a disadvantage (both practical and in their marketing). The government or an ISP organization could contribute to overall cost savings and efficiency by operating an Internet Exchange Point (IXP) and consolidating international traffic.

5.2.4 Bring networks to universities

One place for investment that may pay rich results is in bringing networks to the universities. The huge TU system does not appear to encourage a lot of energy, imagination, and entrepreneurial spirit. Having the Internet, and the world it attaches to, directly available to the students and young instructors would be a good place to make a difference. There are organizations (e.g., the IoE) who are technically able to make this happen if they have resources and support.

5.2.5 Electricity and literacy

In order to promote the spread of Internet throughout the country, more extensive electrification and literacy are necessary conditions. Only the government could bring this about. Thus, it should be noted that the development of the Internet needs to be integrated into a general government strategy on economic and social development.

5.2.6 Public access

Efforts should be made to enhance universal access to communication facilities by pursuing a number of differ-

ent approaches. This includes facilitating the provision of public payphones and call centres. The former will restrict access to voice telephony unless payphones with terminals can be installed.⁴⁶ The latter can be upgraded to include Internet access. The provision of communication facilities in public locations such as schools, post offices, etc. should also be pursued. This can be done by requiring telecom operators and ISPs to provide free or discounted connections to public locations as part of their license obligations.⁴⁷ International donors also have numerous programmes for enhancing Internet connectivity and the Nepalese government should be actively pursuing these projects.⁴⁸

5.2.7 Village Connectivity Pilot Project

The UNDP Poverty Report 2000 stresses the role of government in eradicating poverty. They emphasize decentralization and empowerment of local government, and recommend expanding access to information and communication. Village connectivity projects are underway in many nations. Given Nepal's social goals and growing urban population, they should gain experience in this area. The Ministry of Local Development, which is responsible for strengthening local institutional development, such as bolstering the district and village development committees could perhaps conduct one or more pilot projects in village Internet connectivity. The project could be funded from the telephone rural development fund. Such a project would provide practical experience with e-commerce technology and applications in rural areas, and would hold the promise of improving quality of life and discouraging movement to urban areas. There are many village networking projects in the region that Nepal could learn from.

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- ¹ Ascom, the Swiss telecom equipment manufacturer, is installing multimedia card-operated payphones for MTNL of India. The payphones provide Internet access and e-mail. See Ascom. "Multimedia Services in India." Contact Magazine. January 2000. <http://139.79.106.31/digitalassets/48/file45364_0_contact_2000_01_e.pdf>
 - ² In the US, operators contribute to a fund that is used to provide discounted telecommunication and Internet access service to schools and libraries. See <http://www.fcc.gov/ccb/universal_service/schoolsandlibs.html>.
 - ³ For example, the World Bank's World Links for Development (WorLD) program provides Internet connectivity and training for teachers, teacher trainers and students in developing countries in the use of technology in education. WorLD is currently active in 15 developing countries — Brazil, Cape Verde, Chile, Colombia, Ghana, Mauritania, Mozambique, Paraguay, Peru, Senegal, South Africa, Turkey, Uganda, West Bank / Gaza and Zimbabwe. See <<http://www.worldbank.org/worldlinks/english/index.html>>.

Annex 1: Organizations met

The project team visited Nepal 17 – 21 January 2000 to carry out field research. Below is the list of organizations and people met.

Sr. No.	Description	Time	Place	Date
1.	Meeting With Dr. Rameshananda Vaidya, Member National Planning Commission.	09.30	NPC, Singha Durbar	January 17 th 2000
2.	Meeting with Egbert Pelinck, Director General ICIMOD	1400 - 1500	Pelinck's office	January 17 th 2000
3.	Meeting With Mr. Bhoop Raj Pandey, Chairman Nepal Telecommunication Authority.	1030 – 1300	NTA, Singha Durbar	January 18 th 2000
4.	Meeting with Mr. Shree Ram Poudel, Secretary, Ministry of Information & Communications.	1400 - 1500	MOIC, Singha Durbar	January 18 th 2000
6.	Meeting with Mrs. Sabitri Singh, Deputy Director General, Department of Statistic.	1500 – 1600	Thapathali	January 18 th 2000
7.	Meeting with Mr. C.P Bhattaria, General Manager, NTC and Meeting with Mr. Raghubar L. Shrestha, DGM, and Mrs. Laxmi K. Shrestha, DGM NTC.	1100 – 1300	NTC, Central Office	January 19 th 2000
8.	Meeting With Kiran Sharma, Vivek Rana and Rajib Subba, Nepal Internet Users Group (NIUG)	1400 – 1500	NIUG Office	January 19 th 2000
9.	Meeting With Licensed Internet Service Provider (ISP) Groups and Radio Paging Service Groups and CAN President of Nepal	1530-1630	Mercantile Communication Pvt. Ltd. Conference hall, Cyber café building	January 19 th 2000
10.	Meeting with Tribhuvan University	1500-1600	Vice-Chancellor's office	January 20 th 2000
10.	Meeting with ICT Policy & Strategy Steering committee Members	12.00 –1400	NPC	January 20 th 2000

Annex 2: Framework dimensions

Table 1: The Pervasiveness of the Internet in Nepal

Level 0	<i>Non-existent</i> : The Internet does not exist in a viable form in this country. No computers with international IP connections are located within the country. There may be some Internet users in the country; however, they obtain a connection via an international telephone call to a foreign ISP.
Level 1	<i>Embryonic</i> : The ratio of users per capita is on the order of magnitude of less than one in a thousand (less than 0.1%).
Level 2	<i>Established</i> : The ratio of Internet users per capita is on the order of magnitude of at least one in a thousand (0.1% or greater).
Level 3	<i>Common</i> : The ratio of Internet users per capita is on the order of magnitude of at least one in a hundred (1% or greater).
Level 4	<i>Pervasive</i> : The Internet is pervasive. The ratio of Internet users per capita is on the order of magnitude of at least one in 10 (10% or greater).

Table 2: The Geographic Dispersion of the Internet in Nepal

Level 0	<i>Non-existent</i> . The Internet does not exist in a viable form in this country. No computers with international IP connections are located within the country. A country may be using UUCP connections for email and USEnet.
Level 1	<i>Single location</i> : Internet points-of-presence are confined to one major population center.
Level 2	<i>Moderately dispersed</i> : Internet points-of-presence are located in at least half of the first-tier political subdivisions of the country.
Level 3	<i>Highly dispersed</i> : Internet points-of-presence are located in at least three-quarters of the first-tier political subdivisions of the country.
Level 4	<i>Nationwide</i> : Internet points-of-presence are located in all first-tier political sub-divisions of the country. Rural dial-up access is publicly and commonly available and leased line connectivity is available.

Table 3: Internet-using Sectors of the Economy

Sector	Subsectors	
Academic	Primary and Secondary education	University education
Commercial	Distribution, Finance Manufacturing	Retail Service
Health	Hospitals Clinics	Research Centers Physicians/Practitioners
Public	Central Regional and Local governments	Government Public Military companies

Table 4: Sectoral Use of the Internet

Sector	Rare	Moderate	Common
Academic - primary and secondary schools, universities	>0-10% have leased-line Internet connectivity	10-90% have leased-line Internet connectivity	>90% have leased-line Internet connectivity
Commercial-businesses with more than 100 employees	>0-10% have Internet servers	10-90% have Internet servers	>90% have Internet servers
Health-hospitals and clinics	>0-10% have leased-line Internet connectivity	10-90% have leased-line Internet connectivity	>90% have leased-line Internet connectivity
Public-top and second tier government entities	>0-10% have Internet servers	10-90% have Internet servers	>90% have Internet servers

Table 5: The Sectoral Absorption of the Internet in Nepal

Sectoral point total	Absorption dimension rating	
0	Level 0	<i>Non-existent</i>
1-4	Level 1	<i>Rare</i>
5-7	Level 2	<i>Moderate</i>
8-9	Level 3	<i>Common</i>
10-12	Level 4	<i>Widely used</i>

Table 6: The Connectivity Infrastructure of the Internet in Nepal

		Domestic backbone	International Links	Internet Exchanges	Access Methods
Level 0	<i>Non-existent</i>	None	None	None	None
Level 1	<i>Thin</i>	≤ 2 Mbps	= 128 Kbps	None	Modem
Level 2	<i>Expanded</i>	>2 – 200 Mbps	>128 Mbps -- 45 Mbps	1	Modem 64 Kbps leased lines
Level 3	<i>Broad</i>	>200 Mbps -- 100 Gbps	>45 Mbps -- 10 Gbps	More than 1; Bilateral or Open	Modem > 64 Kbps leased lines
Level 4	<i>Immense</i>	> 100 Gbps	> 10 Gbps	Many; Both Bilateral and Open	< 90% modem > 64 Kbps leased lines

Table 7: The Organizational Infrastructure of the Internet in Nepal

Level 0	<i>None</i> : The Internet is not present in this country.
Level 1	<i>Single</i> : A single ISP has a monopoly in the Internet service provision market. This ISP is generally owned or significantly controlled by the government.
Level 2	<i>Controlled</i> : There are only a few ISPs because the market is closely controlled through high barriers to entry. All ISPs connect to the international Internet through a monopoly telecommunications service provider. The provision of domestic infrastructure is also a monopoly.
Level 3	<i>Competitive</i> : The Internet market is competitive and there are many ISPs due to low barriers to market entry. The provision of international links is a monopoly, but the provision of domestic infrastructure is open to competition, or vice versa.
Level 4	<i>Robust</i> : There is a rich service provision infrastructure. There are many ISPs and low barriers to market entry. International links and domestic infrastructure are open to competition. There are collaborative organizations and arrangements such as public exchanges, industry associations, and emergency response teams.

Table 8: The Sophistication of Use of the Internet in Nepal

Level 0	<i>None</i> : The Internet is not used, except by a very small fraction of the population that logs into foreign services.
Level 1	<i>Minimal</i> : The small user community struggles to employ the Internet in conventional, mainstream applications.
Level 2	<i>Conventional</i> : The user community changes established practices somewhat in response to or in order to accommodate the technology, but few established processes are changed dramatically. The Internet is used as a substitute or straight-forward enhancement for an existing process (e.g. e-mail vs. post). This is the first level at which we can say that the Internet has "taken hold" in a country.
Level 3	<i>Transforming</i> : The user community's use of the Internet results in new applications, or significant changes in existing processes and practices, although these innovations may not necessarily stretch the boundaries of the technology's capabilities. One strong indicator of business process re-engineering to take advantage of the Internet, is that a significant number (over 5%) of Web sites, both government and business, are interactive.
Level 4	<i>Innovating</i> : The user community is discriminating and highly demanding. The user community is regularly applying, or seeking to apply the Internet in innovative ways that push the capabilities of the technology. The user community plays a significant role in driving the state-of-the-art and has a mutually beneficial and synergistic relationship with developers.

Table 9: Examples of Sophistication of Use of the Internet (circa 1999)

Level	Individual Use	Organizational Use
Level 0 <i>None</i>	No use of the Internet	No use of the Internet
Level 1 <i>Minimal</i>	E-mail communication or Web browsing is an infrequent, and novel experience.	E-mail is available, but is not used as an alternative to traditional inter-personal communications (memos, telephone, meetings). Web sites consist of a very small number of static pages reflecting a "minimalist brochure."
Level 2 <i>Conventional</i>	E-mail may be a preferred means of communicating with people in an individual's circle of acquaintances. Web surfing is a regular activity. Some individuals maintain Web sites to post personal interest information. Individuals may listen to broadcast programming on the Web rather than on the radio or television. On-line Chat is an advanced form of Level 2, or possibly a Level 3, depending on whether it is primarily entertainment or results in changes in the individual's social network.	E-mail is widely used for both official and unofficial communication. Listservs or their equivalent are used to disseminate information or solicit feedback. Web sites are largely static, but are extensive and provide customers with in-depth information about products and services, utilization of those services, comparative information, etc. The content is more than just advertisement.
Level 3 <i>Transforming</i>	On-line communities proliferate around shared interests. These communities bring together people who otherwise would not have contact with each other. Interaction between members of such communities is substantive and often interactive. Examples include on-line Bridge clubs, use of ICQ ("I seek you") to create communities, Individuals' Web-cams (e.g. Jenni-Cam knock-offs).	Web sites are dynamic, becoming an alternative distribution channel. On-line ordering is possible. Customer service functions expand to permit customers to conduct transactions that formerly involved employees (e.g. home banking, FedEx package tracking, etc.) International companies use the Internet as a substitute for business trips, enabling round-the-clock collaborative product development. E-Commerce has taken hold.
Level 4 <i>Innovating</i>	Highly sophisticated forms of technology supporting inter-personal interaction and access to content are not only used by, but developed for, a demanding customer base. Principal examples include the development (not just use) of highly-interactive on-line games, ICQ ("I seek you").	The fundamental structure of organizations and their external relations with other organizations is altered. Examples include Egghead Software, which no longer has a bricks-and-mortar presence, and Amazon.com, the on-line bookseller. Business to Business (B2B) vertical exchanges continue to add more and more value as they integrate enterprise information systems.

Acronyms and abbreviations

BT	British Telecom
DoT	Department of Telecommunications (India)
GNP	Gross National Product
ISP	Internet Service Provider
IT	Information Technology
ITU	International Telecommunication Union
LAN	Local Area Network
LDC	Least Developed Country
MBA	Masters of Business Administration
MIS	Management Information Systems
MoD	Ministry of Defence
MoIC	Ministry of Information and Communication (sector ministry responsible for broadcasting and telecoms)
MoST	Ministry of Science and Technology
NIUG	Nepal Internet Users Group
NPC	National Planning Commission
NRS	Nepal Rupees. Approximate exchange rate to one United States dollar = 68.7 (end January 2000)
NTA	National Telecommunication Agency (telecom regulator)
NTC	National Telecommunication Corporation (incumbent telecommunication company)
NTV	Nepal Television
PCC	Public Call Centres
PCO	Public Call Offices
PSTN	Public Switched Telecommunications Network
RTDF	Rural Telecommunication Development Fund
SAARC	South-Asia Association for Regional Co-operation
UNDP	United Nations Development Programme
UNHCR	United Nations High Commission on Refugees
VDC	Village Development Committee
VOIP	Voice Over IP
VSAT	Very-Small Aperture terminals
WLL	Wireless Local Loop

