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Telecommunications in Nepal

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7.1 Introduction

Nepal is a sovereign independent kingdom located in Central Asia on the southern slopes of the Himalaya Mountains, the formidable range of eternal snows. This landlocked country with 147,181 sq. km (56,136 sq. miles) is bordered by India on the east, west, and south and by the Tibetan region of the People's Republic of China on the north. The country is divided into three topographical regions: The humid, subtropical Tarai region in the south is flat and fertile (152 meters above sea level) and makes up 17% of the country; the remaining 83% consists of the mountain region in the center, encompassing the lower Himalayas and swiftly flowing mountain rivers—more than 8,839 meters above sea level—and the arctic Himalayan region in the high Himalayas in the north. Politically, Nepal today is divided into five development regions, comprising 14 zones and 75 districts of nine *ilakas* each. An *ilaka* consists of one or more village communities called *panchayats*, assemblies made up of the representatives of local associations. In all, the 4,015 *panchayats* comprise a total of 585 provinces.

Modern Nepal was created in the later half of the eighteenth century when Prithvi Narayan Shah, the ruler of the small principality of Gorkha, formed a unified country from a number of independent hill states. After 1800, the heirs of Prithvi Narayan Shah proved unable to maintain firm political control over Nepal. A period of internal turmoil followed, heightened by Nepal's defeat in a war with the British from 1814 to 1816. Stability was restored after 1846 when the Rana family gained power, entrenched itself through hereditary prime ministers, and reduced the monarch to a figurehead. The Rana regime, a tightly centralized autocracy, pursued a policy of isolating Nepal from external influences. Nepal was never colonized, even during the colonial era. Nepal maintained its national independence, but its policy also impeded the country's economic development.

In 1950 King Tribhuvan, a direct descendant of Prithvi Narayan Shah, fled his "palace prison" to newly independent India, touching off an armed revolt against the Rana administration. This allowed the return of the Shah family to power and, eventually, the appointment of a non-Rana as prime minister. A limited constitutional monarch was established in 1951. During most of the 1950s, the government was controlled by the monarchy, first under Tribhuvan and then, after his death in

1955, his son, Mahendra. In early 1959 King Mahendra promulgated Nepal's first constitution, providing for a bicameral parliament. Shortly thereafter, the first democratic elections were held for the national assembly. Less than 18 months later, however, King Mahendra declared the experiment in parliamentary democracy a failure, dismissed the Koirala government, dissolved Parliament, suspended the constitution, and again ruled directly from the palace. In December 1962 the King promulgated a new constitution, reasserting royal power and providing for a "partyless" system of government based on the panchayat (village council), with a prime minister appointed by the king. In January 1972 King Mahendra died and was succeeded by his 27-year-old son, King Birendra. In the spring of 1979 student demonstrations and antiregime activities led to a call by King Birendra for a national referendum to decide on the nature of Nepal's government—either the continuation of the panchayat system or the establishment of a multiparty system. In the referendum, held in May 1980, 54.8% of the voters supported the panchayat system with reforms. As a result, in December 1980 the government issued a decree amending the constitution. An agitation led by the Nepal Congress Party and the United Left Front (a coalition of seven Communist parties), which culminated in strikes in the major cities of Nepal during February and March, led to democratic reforms in April 1990. The king dissolved the panchayat system, lifted the ban on all political parties, and removed all references to the "partyless" structure from the constitution. The first democratic election in three decades was held on May 12, 1991 and marked the end of a monarchy. The economic development policy of Nepal's first democratic government is easing state controls in an effort to increase private participation in the impoverished economy.

Nepal has traditionally been very dependent on India, but in August 1976 the Trade and Transit Treaty between the two countries expired. In March 1978 this agreement was replaced by two treaties (renewed in 1983 and 1984) allowing Nepal to develop trade with other countries. In June 1987 Nepal and India signed an agreement to establish a joint commission for the promotion of economic cooperation between the two countries, but in March 1989 the trade and transit agreements regulating commerce between the two countries lapsed, and India did not renew them. In June 1990 Nepal and India agreed to restore relations to what they were prior to April 1987.

Nepal formally established relations with China in 1955. Since then, their bilateral relations have generally been very good, and the Chinese have contributed large amounts of economic assistance to their smaller neighbor. The previous Nepalese government's decision to purchase arms and armored personnel carriers led to a trade dispute with India that has since been resolved.

Although much of the country is heavily forested and too steep for cultivation, about 91% of the labor force was engaged in agriculture, forestry, and fishing¹ in 1981 for lack of other options. Agricultural settlements are mostly confined to the Tarai plane in the south, leading to a small exportable surplus of foodstuffs.

Nepal ranks among the poorest countries in the world, partly due to its inhospitable terrain of isolated valleys and towering mountains. Since the mid-1960s, the country's economic growth has barely kept pace with the increase in its population. In 1993 Nepal's gross national product (GNP) per capita was \$200, which

was among the 12 lowest in the world.² Between 1965 and 1985 it was estimated that the country's GNP per capita increased, in real terms, at an average rate of 0.1% per year. The average annual growth of overall gross domestic product (GDP) was 2.3% in 1965–1980, rising to 3.4% in 1980–1985 (Shah, 1988).

The population of Nepal is growing much more rapidly, however. Estimated at 9.5 million in 1961, it almost doubled in the next 15 years to roughly 17.6 million by 1987, and is expected to reach between 20 and 22 million by the turn of the century. Overpopulation is already straining the "carrying capacity" of the middle hill areas, and population pressure on natural resources will inevitably increase.

7.2 Telecommunications Development

The isolation that the Rana family imposed on Nepal until its ouster in 1951 meant that when the nation entered the modern era at midcentury it had virtually no schools, hospitals, roads, industry, civil service, telecommunications, or electric power. The lack of transport and telecommunications facilities in particular has contributed to the country's slow rate of economic growth. Both are extremely important for Nepal, given its severe climate and rugged terrain. Yet until 1947, when the first airplane flew into Kathmandu, the only access to the Kathmandu Valley was by foot. In 1955 the first motorable road, the Tribhuvan Rajpath, was completed between India and Kathmandu.³ Except for the area around the capital of Kathmandu, however, access to most of the country is still difficult; 25 of the 75 administrative districts have no roads navigable by motorized transportation.⁴ Transport development has been hampered by scarcity of capital, shortage of technicians and proper equipment, and above all, topographical difficulties—all factors that have also retarded the development of Nepal's telecommunications infrastructure. Realizing the important role telecommunications plays in socioeconomic development, however, Nepal has invested and is doing so heavily in both sectors.

Telecommunications development began in earnest in 1975, with the establishment of Nepal Telecommunications Corporation (NTC), and since then the country has continued to allocate a large share of its resources to installing and expanding its telecommunications networks.

Both transport and communications have also received considerable emphasis in public policy statements. By 1992 Nepal had completed seven five-year economic development plans, and although agriculture was given top priority, transport and communication received the highest share of total government expenditures in the first four of seven five-year plans, varying between 35% and 50%. It is evident that prior to the fifth and sixth plan, resource allocations were skewed rather heavily toward transport and communication, which still received 23% of total expenditures (Shrestha and Mattas, 1990). According to International Telecommunication Union (ITU) statistics, in 1982 the national investment in telecommunications services (which include expenditure on initial installations and on additions to existing installations where the usage is expected to be over an extended period of time) was Rs27 million (\$1 = Rs14.3 in 1982), which reached Rs608.8 million in 1985. Total current expenditure for all telecommunications

services per year increased from Rs49.3 million in 1982 to Rs214.7 million in 1987.⁵ (Current expenditure means expenditure other than investments and refers to the running of telecommunications services on an annual basis and comprises like salaries of operation staff, cost of material for operation, and maintenance.) Total staff in telecommunications services (including both operating and technical staff) increased from 2,106 in 1982 to 3,585 in 1993.⁶

Nepal has consistently encouraged foreign aid donor countries to invest in the area of telecommunications. In November 1982 the country's first satellite earth station was built in Sagarmatha, near Kathmandu, with British help. Nepal is a signatory to INTELSAT.

7.3 Radio and Television

In 1960 there were only about 12,000 receiving sets and 50 public listening centers in Nepal. Receiving sets increased to 60,000 in 1971, 340,000 in 1981, and an estimated 2 million radio receivers in 1986.⁷ Broadcasts are on short- and mediumwave, and transmissions are in Nepali, Hindi, Newari, and English.

Nepal's first television station began broadcasting within the Kathmandu Valley. At that time there were an estimated 27,000 television receivers, including 25,000 color receivers, in use. The NTC transmits both radio and television programs, and its radio and television studios are linked with the Sagarmatha Satellite Earth Station by a microwave system. The corporation broadcast 597 minutes of television programming in 1990 and received programs totaling 28,868 minutes.

Although the Nepal Television Co. had maintained a monopoly of television since the inception of television in Nepal in January 1994, the government licensed three private companies (Space Time Network Pvt. Ltd., the Business Group of India Co. Ltd., and Sangrela Channel Pvt. Ltd.) to offer satellite-based television services. In October 1994 the Space Time Network became Nepal's first Cable Network offering subscribers access to satellite TV channels such as StarTV and other international services. By 1995, this network had 1,000 subscribers. Nepal's government hopes that its liberalization of the satellite broadcast industry will spur investment in this sector and make Nepal a hub for satellite uplink services in the region.

7.4 Telegraph

Nepal has traditionally been very dependent on India, which until 1964 controlled its external telegraph and postal services. In 1964, however, Nepal began handling its own external telegraph and postal services by mutual agreement. Before the satellite earth station was built in 1982, Nepal had telegraph links with India and Pakistan only. Now, international telegraph service is available to all parts of the world via satellite and microwave circuits, and Nepal has direct telegraph connections with India and Japan.

Domestic telegraph service is the basic means of communication in remote areas

of Nepal and plays an important role in the day-to-day administrative work of the government. National paid telegraph increased from 229,410 in 1982 to 1,134,346 in 1987.⁸ Telegrams are transmitted by high-frequency wireless communication in 20 of Nepal's 75 districts; in the other 55 voice circuits and telegraph circuits are used.

7.5 Telephone

Nepal's telephone network was established during the early 1970s, but by 1978 there were only 9,100 telephones for a population of 13.5 million.⁹ In the early 1980s the country's trunk lines consisted of a wireless system connecting major cities such as Kathmandu and Pokhara. Private telephone lines did not exist in more remote areas, however. Instead, the central towns of individual districts were allotted around two hours of shortwave radio communication time per day.

The country's telecommunications network has expanded rapidly during the past 15 years. The number of main lines increased from 9,100 in 1978 to 30,404 in 1987,¹⁰ and it reached 80,000 in 1994. That same year, telephone density stood at four per 1,000 population. As of 1993, there were 45 telephone exchanges serving 55 out of 75 districts of the kingdom; 100% of these lines are served by automatic exchanges and 87% of the network is digital. Subscriber trunk dialing is available to 60 destinations. There are six regional offices, 32 telecommunication area offices, and 80 long-distance Public Call Offices (PCOs), which provide telephone service in 55 districts. According to a survey conducted by a Japanese special study team in Nepal, all the PCOs have been heavily used since they were opened and are crowded daily with people waiting to place or receive calls. To avoid congestion, each PCO is equipped with two lines, one for incoming calls and another for outgoing calls. The number of calls handled by each line ranges from 30 to 70 per day. Private telephones are used primarily for business (60%), personal calls (20%), and international calls placed by foreign tourists, mountaineers, and hikers (20%) (Masatomi, 1989).

As in other countries, telecommunications developed at first primarily in and near the cities. The NTC introduced point-to-point and multiaccess radio networks in a few rural areas, but most outlying districts were originally linked by a rural microwave network. Since the Rural Telecommunication Network Improvement Project was implemented in Nepal in 1987, however, the systems have expanded to include 961 route km of analog microwave.

With the ever-increasing significance of international contacts for businesses and individuals alike, and especially for the promotion of tourism and related industries, international telecommunications will play an increasingly important role in the nation's economic development. As of 1995, NTC remained the sole provider of international telecommunications services in Nepal and continues to enhance the international telecommunications network. The main outlet for Nepal's international telecommunications traffic is the satellite link accessing the Primary Path INTELSAT Satellite over the Indian Ocean region. Nepal is also connected with India via a coaxial system over the land border, interlinking the microwave network of both countries, and with Bangladesh by VHF.

International direct dialing service is available to 38 countries, with some 144

international telephone circuits in operation; 20 of these are semiautomatic. In 1990 international telephone traffic grew by 40% to a total of 7,091,231 paid minutes; 86% is directly dialed by the subscriber. India accounts for 65% of the total outgoing telephone calls placed from Nepal, followed by the United States, Japan, and the United Kingdom.

Domestic telephone service has improved significantly since its founding in the early 1970s, with a drop in the fault rate from 18 per 100 subscribers per month during 1988/1989 to 16 faults in 1992. This is due in large part to the expenditure of \$16.2 million on new telephone plant and equipment in 1989,¹¹ \$21.4 million in 1991, and \$45.5 million in 1993.

7.6 New Plan of Telecommunications

Under the 1991–2000 master plan for the area, Kathmandu City and Kathmandu Valley will be equipped with 100,000 telephone lines (all digital), two international exchanges, a high-capacity transmission network, and local cable networks. It is hoped that telephone density in the valley will be tripled and upgraded to the Consultative Committee on International Telegraph and Telephone (CCITT) standards. The plan also includes equipment to support increased data transmission and television transmission needs. With regard to further improvements in quality service, NTC expects to reduce the ratio to only 1 fault per 100 subscribers per month, or less than 0.5 fault per connection per year.

The government's fifth telecommunication plan (1992–1996) also intends to build up the neglected communications infrastructure in outlying regions, about 27% of which consists of remote, snowbound, mountainous terrain. The NTC plans to bring direct subscriber dialing to 2,000 rural subscribers in about 400 area service centers, commercial centers, and other important centers and eventually to reach all of the country's 4,015 villages. This goal is to be met by installing PCOs, some equipped with digital exchange and digital remote line units, with a capacity of between 250 and 1,000 subscribers each. High-frequency radio will continue to be used in areas situated more than 4,000 meters above sea level. Also planned is the installation of modern telecommunications facilities to link remaining district headquarters via point-to-point microwave radio, thin route satellite links, and a multiaccess radio system as well as connect about 3,200 subscribers by means of several MARTS systems. The fifth plan provides as well for a new Kathmandu-Pokhara-Bhairahawa-Nepalqunj microwave system, in addition to new fiber-optic systems in the junction network and a new international gateway exchange.

7.7 Adopting Advanced Technology

Small and still largely undeveloped, Nepal has been forced to base its telecommunications expansion on pragmatism rather than ideology. As a result, the new system is characterized by very advanced technology, including a computer-based operations management system.

Geography and decades of neglect dictated, first of all, that the country leapfrog over older, less expensive regionally produced equipment into wireless and digital technology that could be purchased. Solid state technology is far more efficient and robust and requires much less maintenance than electromechanical systems, so it is much better suited to Nepal's harsh climate and terrain. Fully digital systems are also, in general, less costly, more efficient, and more flexible than electromechanical systems. The NTC has introduced digital exchange equipment as well as has installed 17,100 lines of E10-B and 47,000 lines of S12. Both the radio communications equipment and telephone exchanges installed are the ultimate in high technology—they are practically solid integrated circuits, designed in modules so that defective sections can be easily removed and replaced, making operations and maintenance easier. In fact, with a digitalization rate of 87%, Nepal might be considered a "digital island" in South Asia.

In addition, as mentioned earlier, NTC plans to install a new international gateway exchange and fiber-optic systems in the junction network. Fiber-optics plays an increasingly important role in the drive to digitalize public transmission networks. Digitalization will also spur demand for primary order multiplexing, digital cable, and digital microwave systems. Also NTC is planning to introduce mobile and data communications services by the year 2000.

Nepal has not only invested heavily in the development of its telecommunications networks but has also emphasized postinvestment operations management and maintenance in order to make efficient use of the very sizeable initial capital investment. Like most developing countries Nepal has suffered from low telephone density, high calling rates, relatively inferior quality of service, and a very large work force. As telephone networks grew in size and complexity, the inadequacies of traditional operating methods became apparent: inefficient use of a large work force and excessive complexity of and inefficient use of information on piles of paperwork, in part due to the difficulty of maintaining up-to-date network data and operational statistics.

To counter these problems, an operations management system developed by Televerket (Sweden) was established as part of an International Telecommunications Union project between 1984 and 1987, based on existing local human, material, and financial resources.¹² Fundamentally, this system aims at making the best use of capital by providing good quality, reliable service; lowering operating costs; and improving the efficiency of the whole telecommunications undertaking at a small fraction of the capital cost. It is basically constituted of maintenance control centers (MCC), field units corresponding to maintenance areas, and a computer facility. Three operations are carried out by the system: execution of straightforward work procedures at the MCC; recording of relevant data in an easily accessible and comprehensible form; and production of operational statistics via computers.

In addition to improved maintenance management, network information, and installation and constructive control, the cost-effective MCC system also helps to ensure efficient usage of expensive plant facilities, an acceptable level of service, and moderate operating cost. Since it was instituted, monthly fault rates per 100 subscribers have dropped from 120 in 1983, to 66 in 1984, to 26 in 1987,¹³ and to only 14 faults in 1990.

7.8 Dependence on Foreign Aid

The downside of leapfrogging into the wireless world with digital telecommunications is Nepal's heavy dependence on foreign aid. Lack of local production capability has led to reliance on foreign investment, technology, equipment, supply, and personnel, with some projects financed by bilateral aid from countries such as Japan, Finland, and Denmark, which also paid for goods and services supplied by their own national firms. Other Nepalese telecommunications projects are funded by the World Bank. For example, in 1992 the World Bank approved a loan of \$24 million to address network shortages and improve performance as well as to examine possibilities for restructuring the sector.

In the early 1980s NTC approached Japan for assistance. In 1983 the Japan International Cooperation Agency (JICA) mapped out a plan for a state-of-the-art telephone network linking all district headquarters and major commercial and tourism centers. With the assistance of JICA, the Rural Telecommunication Network Improvement Project was founded, and the agency financed new public call offices in approximately 64 locations. The Nepal Telecommunications Corporation expected Japan to renew its assistance to cover further installations, but JICA declined to finance the remaining parts of the program. Finland and Denmark stepped in instead to finance Nepal's local and long-distance transmission infrastructure, and these two countries have also funded NTC's program to update its outside plant in major commercial centers and to reach the unserved 26 of the kingdom's 75 rural districts.

While Denmark's aid agency, Danida, has been interested in urban installations, the focus of its Finnish counterpart, Finnida, has been on extending service to rural areas, especially in the difficult terrain of the northwest and southeast. The grants they have provided during Nepal's seventh five-year plan have led directly to contracts for Scandinavian suppliers.

Danida's grant of \$15.5 million to Nepal gave Carl Bro International, a Copenhagen-based consulting firm, an opportunity to get involved in NTC's plans for the expansion of the national network. Carl Bro has helped to supervise the installation of outside plant in Kathmandu and other major cities in Nepal. In addition, NKT was awarded a contract for the installation of copper cable for the local urban loops. Carl Bro has also carried out a feasibility study for a nationwide public pay-phone network. Using \$5.3 million financing from Finland, Nokia installed a new digital transmission link from Kathmandu eastward. Finnida financing also paid for Nokia equipment in the early construction of NTC's digital transmission network.

The World Bank has also helped to upgrade and expand Nepal's telecommunications system by offering 20 multiaccess radios as a part of a \$28 million International Development Assistance (IDA) credit. The remaining funds have financed earth station enhancements and the purchase of office, telex, and transmission equipment.

A project financed jointly by the World Bank and the Finnish government is a computerized billing network, which will produce telephone and telex bills for the whole country by using personal computer-based local area networks.

7.9 Socioeconomic Impact of Telecommunications Development

A stronger telecommunications system can help to lay the foundation for modern statehood by increasing Nepal's economic and commercial efficiency, improving its social and emergency services, and achieving a more equitable distribution of the social, cultural, and economic benefits of development. Most important, perhaps, by multiplying interaction at all levels it helps to forge a unified nation.

The new telephone networks have broken up the isolation of local villages and districts, facilitating the exchange of information and extending administrative management. By 1994 telephones reached 55 out of 75 administrative districts, and by 2,000 NTC plans to bring direct subscriber service to about 400 ilaka service centers and eventually to all 4,015 villages. Subscriber lines available at present are allotted to major government offices and are used primarily for arbitration and to settle problems between local residents and divisions of the central government. The district panchayats also use them to maintain contact with the central authorities and with organizations in neighboring districts.

In addition to daily administrative or commercial traffic, the communications system has proved indispensable in coping with disasters and emergency situations. In September 1988 a large landslide occurred in a remote mountain hamlet about six hours by foot from Beni, and 60 of the 130 villagers perished. A runner was sent from the village to Beni, where officials promptly put through a call to Kathmandu for rescue assistance. To the villagers' surprise, a rescue party arrived the following day¹⁴; without the telephone it would probably have taken a full week.

Communication facilities are a precondition for tourism development. It is only possible to attract foreign travelers when they can access reliable information on services and facilities for their potential destinations. Travelers will feel safe in their trip if they can connect with police officers, hospitals, travel agencies, or their family members.

Nepal's tourist industry has grown rapidly, from 156,123 visitors in 1978¹⁵ to 265,000 in 1988¹⁶; and hotel beds increased from 2,099 in 1977 to 7,086 in 1986.¹⁷ Tourism is now Nepal's single-largest foreign exchange earner, yielding \$63 million in 1988¹⁸ and bringing much-needed employment and other benefits to some less developed regions of the country.

7.10 Outlook

One change that will occur in the telecommunications sector is the introduction of private participation and eventually the privatization of NTC. The road to private participation of the telecommunications sector began during the fifth telecommunications plan, which included studies on the restructuring of the sector. Although in 1995 the government was still reviewing plans to privatize NTC, the move toward private participation in the sector began in 1994 when the government signed a memorandum of understanding with the Telecom Holdings, a subsidiary of Telecom Asia of Thailand, for a build-operate-transfer telecommunications project.

In August 1995 the Ministry of Information and Communications announced a

preliminary invitation for applications from private companies to establish, operate, and maintain telecommunications network services. The request was expected to be finalized by the end of 1996. The final request for license applications is expected to include the following networkers/services:

1. Basic telephone services based on new technology, for example, wireless in local loop (WILL)
2. Cellular mobile radio communications services
3. Radio paging services

It is expected that the introduction of private participation will be a prelude to the privatization of Nepal Telecommunications Corporation. Subsequently, numerous international telecommunications companies are positioning themselves to take advantage of future changes in Nepal's telecommunications market. For example, in 1994 Jo Smine International DLC, a major Thai conglomerate, established a new company to operate telecommunications businesses in Nepal and other neighboring countries.

Nepal seems to recognize that an efficient, modern telecommunications infrastructure is vital for effective governance and socioeconomic development. Because the country is small and has limited resources, its telecommunications development will continue to be influenced by foreign aid and international organizations. Whether these new systems are used to benefit the old elite or the new elite and whether they will reach the underserved in remote areas are open questions. The answers will depend on both the country's internal politics and on the preferences of its benefactors.

Notes

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