



Report and Recommendation of the President to the Board of Directors

Project Number: 40054
November 2007

Proposed Asian Development Fund Grant, Loan,
and Technical Assistance Grant
People's Republic of Bangladesh, Kingdom of Bhutan,
India, and Nepal: South Asia Subregional Economic
Cooperation Information Highway Project

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 20 November 2007)

Currency Unit of Bangladesh	–	taka (Tk)
Tk1.00	=	\$0.0146
\$1.00	=	Tk68.59
Currency Unit of Bhutan	–	ngultrum (Nu)
Nu1.00	=	\$0.0254
\$1.00	=	Nu39.34
Currency Unit of India	–	Indian rupee/s (Re/Rs)
Re1.00	=	\$0.0254
\$1.00	=	Rs39.34
Currency Unit of Nepal	–	Nepalese rupee/s (NRe/NRs)
NRe1.00	=	\$0.0159
\$1.00	=	NRs62.944

ABBREVIATIONS

ADB	–	Asian Development Bank
ADF	–	Asian Development Fund
CEC	–	community e-center
CLS	–	cable landing station
EA	–	executing agency
EIRR	–	economic internal rate of return
EMP	–	environmental management plan
GDP	–	gross domestic product
ICT	–	information and communication technology
ICTWG	–	Information and Communication Technology Working Group
ISP	–	Internet service provider
IT	–	information technology
MDG	–	Millennium Development Goal
NGO	–	nongovernment organization
PMU	–	project management unit
ROW	–	right-of-way
SASEC	–	South Asia Subregional Economic Cooperation
SASECRN	–	SASEC regional network
TA	–	technical assistance
VSAT	–	very small aperture terminal

WEIGHTS AND MEASURES

km	–	kilometer
MB	–	megabyte

NOTE

In this report, "\$" refers to US dollars.

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GRANT, LOAN, AND PROJECT SUMMARY

Borrowers/Grant/Technical Assistance (TA) Beneficiaries	Bangladesh, Bhutan, India, and Nepal
Classification	Targeting classification: General intervention Sector: Transport and communications Subsector: Telecommunications and communications Themes: Sustainable economic growth, inclusive social development Subthemes: Addressing information and communications technology issues, human development
Environmental Assessment	Category B. An initial environmental examination was undertaken. (A summary is in Appendix 10.)
Project Description	<p>With the Project, the Asian Development Bank (ADB) will continue its support of and commitment to regional cooperation, particularly in information and communication technology (ICT), under the Subregional Economic Cooperation (SASEC) Program, which covers Bangladesh, Bhutan, India, and Nepal. The SASEC ICT Working Group (ICTWG) established in 2003, has identified three most urgent areas for improvements in ICT in the subregion: (i) cross-border connectivity, (ii) rural access to information, and (iii) human resource capacity. To meet these needs, the SASEC countries have developed the concept of the SASEC information highway, to deliver and facilitate modern broadband information, communication, and knowledge services within and across borders to governments, businesses, research institutes, and rural and remote communities.</p> <p>To support the SASEC information highway initiative, the Project has three components: (i) a SASEC regional network with fiber-optic and data interchange capacity, directly connecting the four SASEC countries; (ii) a SASEC village network expanding broadband ICT access to 110 rural communities in the SASEC countries and directly connecting the communities for local networking and information sourcing; and (iii) a SASEC research and training network building technical and business skills in ICT, particularly in developing local content and e-applications (such as e-government, e-learning, tele-medicine, e-remittance, e-commerce) for the needs of the poor.</p>
Rationale	<p>There is great diversity among the SASEC countries, with each country at a quite different stage of ICT development and with different objectives and circumstances. Bhutan has less than one million people and little ICT experience, while India has more than one billion people and substantial ICT achievements. This diversity presents considerable opportunities for cooperation.</p> <p>Cross-border connectivity is recognized as a critical area in need of regional cooperation, as ICT infrastructure across borders has been</p>

fragmentally developed and is often outdated. For example, Internet traffic in the subregion often goes via third parties, and overly relies on satellite transmission. For this reason, Internet connections in landlocked countries like Bhutan and Nepal are much more costly and lower in quality. On the other hand, Bangladesh and India, despite being connected to major submarine cables, do not yet fully capitalize on the business potential to provide high-quality, affordable, and reliable broadband capacity to neighboring countries. Regionally integrated and high-quality broadband capacity would not only keep local traffic local and optimize the cost of interconnection within the region but also contribute to reducing the prices of ICT services to end users and boosting ICT use across borders.

Bridging the rural-urban divide in ICT is another area for regional cooperation. Commercially driven ICT development has left rural people behind and widened the disparity between rural and urban areas. Rural community e-centers (CECs) have been tested and have proved effective in addressing this issue. India's rural CEC models and Bangladesh's Grameen village phone are pioneering and innovative examples of the use of ICT in reducing poverty in the countryside. The CEC movement in India has evolved into a national initiative, with the prospect of Internet connectivity in every village. Grameen Telecom in Bangladesh is now a major mobile operator and has extended the application of its microfinance model to Internet village kiosks in rural areas. CECs have been tried out for some years in Nepal and more recently in Bhutan, but these experiments have yet to reach nationwide scale, under government or private leadership. A regional approach would enhance the efforts of the SASEC countries to bridge the digital divide by sharing their experiences and connecting rural communities with one another and with the rest of the world, and ultimately with the vast source of information, content, and services that is the Internet.

The need for more and higher-quality training in ICT and for heightened ICT literacy and awareness has been expressed by all the SASEC countries including India, where ICT development has created millions of jobs over the past few decades. All these countries recognize the relationship between good-quality tertiary training and research, on the one hand, and staff retention and ultimate industry development, on the other. At present, except in certain public and private institutions of excellence, many ICT training initiatives do not meet international quality standards. India may have trained a large pool of skilled human resources in the ICT sector, but it still needs to maintain and upgrade the quality of its human resources to sustain its competitive edge in ICT in the global market. The other SASEC countries are more seriously constrained when it comes to mobilizing qualified human resources for ICT. A regional approach to building human capacity through shared resources would enable the SASEC countries to capitalize on the digital opportunities as a group.

Impact and Outcome	The Project will enhance the benefits of ICT and regional cooperation for inclusive growth and poverty reduction by increasing the supply of affordable broadband, skilled ICT manpower, and local content and e-applications particularly for the needs of the poor. It is also expected to help the SASEC countries improve their productivity and efficiency and participate fully in the global information economy.
Project Investment Plan	The project investment cost is estimated at \$24.0 million, including taxes and duties of \$2.7 million.
Financing Plan	ADB grants of \$4.7 million to Bhutan and \$9.0 million to Nepal, and a loan of \$3.1 million to Bangladesh from Special Funds resources will finance 70% of the project cost. The governments of the SASEC countries will finance \$7.2 million, or 30%. The Asian Development Fund (ADF) loan to Bangladesh will be denominated in special drawing rights, and will have a term of 32 years, including a grace period of 8 years, and an interest rate of 1% per year during the grace period and 1.5% after that.
Estimated Project Completion Date	31 December 2009
Period of Grant and Loan Utilization	1 April 2008—30 June 2010
Executing Agencies	Ministry of Science and Information and Communication Technology of Bangladesh; Ministry of Information and Communication of Bhutan; Department of Information Technology, Ministry of Communications and Information Technology, of India; and Ministry of Information and Communications of Nepal.
Implementation Arrangements	<p>The three networks under the Project—a regional network, a village network, and a research and training network—will be built and run by private sector service agencies to be selected from eligible providers, through public-private partnerships (PPPs) developed and modified on the basis of PPP practices in India and elsewhere.</p> <p>For the regional network, each country will select a service agency with a national fiber-optic network and an international long-distance license, to build, keep, manage, and operate the network and equipment as designed, built, and installed. The operation of the village network (including CECs) and the provision of minimum services to the poor will be franchised through auction, lease, or other appropriate means to private entrepreneurs among rural Internet service providers (ISPs) or nongovernment organizations (NGOs), which will be provided with financial support to ensure the sustainability of the village network. For the research and training network, service agencies in each country will be selected from capable ICT research</p>

institutes including universities, to design and conduct research and training for ICT professional development. Several agreements will be drawn up and signed: (i) a multilateral cooperation agreement, to be signed by the executing agencies (EAs) for all the SASEC countries; (ii) six bilateral interconnection agreements, each one to be signed by the regional network service agencies of the two countries concerned; and (iii) 12 in-country service agency agreements, each one to be signed by the EA and the service agency for each of the three project networks.

A steering committee, consisting of the secretaries of the EAs for the four countries, will be formed to jointly supervise and monitor overall project implementation. It will also guide the project management units (PMUs) in coordinating joint activities, and will clear the draft agreements for signing. Each PMU, to be established under each EA, will be headed by a project director (joint secretary) and will have as members a technical expert (project manager), an administrative staff, and a representative of the service agency. It will be responsible for the day-to-day implementation of the Project in coordination with project management consultants. The PMU will (i) recruit the country project management consultants in consultation with ADB; (ii) supervise and monitor the work of these consultants; (iii) maintain project accounts (including the imprest account), endorse the invoices presented by the project management consultants, and prepare withdrawal requests for payments to contractors; (iv) prepare the statement of expenditure in support of requests for imprest account replenishment, and prepare the yearly financial statement for the Project and have it audited by an external auditor; and (v) report each month on the progress of the implementation to the steering committee and ADB.

Procurement

The goods, services, and civil works to be financed under the ADB grants and loan will be procured according to ADB's *Procurement Guidelines* (2007, as amended from time to time). Civil works and system development and installation contracts will be procured according to the procurement plan (see Appendix 6).

Any necessary modifications or clarifications of recipient procurement procedures will be documented in the procurement plan.

Project management equipment for the PMU will be procured by the project management consultants according to the procurement plan (see Appendix 6).

Consulting Services Project management consultants will be hired to assist the EA in implementing the Project. There will be an international team (team leader, design engineer, and procurement specialist) and four country teams. Each country team will have three subteams: a SASEC regional network team, a village network/research and training network team, and a joint team. The first two subteams will each comprise a team leader, a design engineer, a procurement specialist, and a network engineer. The joint team will consist of a social development specialist, an environment specialist, and a quality assurance specialist. An international consulting firm will be hired for 36 person-months, and national consulting firms, for 100 person-months each in Bangladesh, Bhutan, and Nepal, and 63 person-months in India. The project management consultants will (i) design all networks to be procured under the Project; (ii) prepare bid documents; (iii) assist the PMU in tendering (prequalification, evaluation of proposals, etc.); and (iv) supervise contractors.

The project management consultants will be selected and hired according to ADB's *Guidelines on the Use of Consultants* (2007, as amended from time to time) and through quality- and cost-based selection (80:20) and simplified technical proposal. ADB will consider approving the advance recruitment of consultants on the understanding that such action will not necessarily commit ADB to financing the Project.

Project Benefits and Beneficiaries The Project is expected to have an overall economic internal rate of return of 34.3%. The direct tangible benefits will come from (i) savings accruing to Nepal and Bhutan on the cost of connecting to Internet service as a result of the shift from expensive satellite links to cable landing stations (CLSs) made possible by the SASEC regional network, and (ii) incremental revenues to be earned by India and Bangladesh from payments by Nepal and Bhutan for the CLS connection. Improved and more affordable broadband access to the Internet resulting from the Project will also boost the development and consumption of ICT and thereby increase economic productivity and efficiency.

Poverty is often found to be significantly related to a lack of knowledge and information; ICT can make such knowledge and information more accessible. Rural poverty rates in the SASEC countries range from 20% (India) to 42% (Bhutan), and amount to 40% in Bangladesh and 35% in Nepal. More than two thirds of the rural population in these countries subsists on agriculture (including livestock) and forestry. Rural farming relies on rudimentary and outdated information and offers limited opportunities to market agricultural products. Rural children attend school with greater difficulty than their urban counterparts, stay for shorter periods, leave with fewer qualifications, and are less likely to proceed to further education, whether technical or higher education. Public services, including health care and finance, are usually centered in urban areas.

Underserved and isolated by physical distance and poor transportation, rural people are even more marginalized. The Project will help address such challenges by improving rural ICT connectivity and human capacity to use the vast information and knowledge resources and e-services in agriculture, marketing, employment, health care, education, and government that are available on the Internet. The Project will also enable the integration of rural communities for local networking and local information sourcing, giving them better opportunities to create and use knowledge for greater empowerment and improved livelihood.

Risks and Assumptions

The successful implementation and operation of the project facilities will depend largely on multilateral and bilateral agreements among the SASEC countries. Any difficulty or procrastination in signing those agreements will delay or otherwise hamper the implementation and operation of the facilities. ADB's continued support for the SASEC ICTWG will facilitate the signing of the agreements.

Taking on the social responsibility of serving the rural communities could render the operation of the SASEC village network and research and training network financially unviable, at least in part. To mitigate this financial risk, franchises will be granted to private entrepreneurs such as rural ISPs and ICT research institutes to run the networks as commercial and social operations. A financial resource pool with contributions from the service agencies in the SASEC regional network will provide needed financial support for the social responsibility functions of these agencies. ADB will ensure effective franchising of the operations of the village and research and training networks, to maximize the benefits of public-private partnership.

The price for connecting to CLSs in India is competitively determined in the market. But a market price for the service is yet to be established for Bangladesh. ADB will collaborate closely with the EA and the telecommunications regulator in Bangladesh in setting an optimal rate for the operation of the SASEC regional network.

Technical Assistance

The Project will be complemented by an attached TA, which will build up technical and business skills in developing local ICT content and e-applications (such as e-government, e-learning, tele-medicine, e-remittance, e-commerce) particularly for the poor. The research and training network will therefore serve as a SASEC regional ICT knowledge network, providing teaching, research, professional development, and related support for local innovation and entrepreneurship in the creation of local content for the regional e-businesses and e-services to be delivered over the SASEC regional network and the SASEC village network. To this end, the Project will set up a research and training center in the four selected ICT research institutes in the SASEC countries by providing (i) connectivity to the SASEC regional network, (ii) support for faculty mobilization and space rental, and (iii) ICT development support. The research and training

centers will (i) design and conduct research and training in e-business development and ICT professional development, for the delivery of services to rural communities through the SASEC village network and CECs; and (ii) develop open content and training programs in ICT professional development.

The total cost of the TA is estimated at \$4.4 million, which will be financed with a grant from ADB's Regional Cooperation and Integration Fund. ADB will be the Executing Agency for the TA, and the EAs chosen to implement the Project will be the Implementing Agencies (IAs). The IAs and the project steering committee will be responsible for implementing the TA in coordination with ADB. The project management consultants to be hired for the Project will design the research and training network for connectivity to the SASEC regional network and the selected ICT research institute in each country. These institutes will be selected and hired according to the procurement plan. The TA will be implemented for 45 months, from April 2008 to December 2011.

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed grant to Bhutan and Nepal and a proposed loan to Bangladesh for the South Asia Subregional Economic Cooperation (SASEC) Information Highway Project, and a proposed technical assistance (TA) grant to Bangladesh, Bhutan, India, and Nepal for the SASEC regional information and communication technology research and training network. The design and monitoring framework is in Appendix 1.

II. RATIONALE: SECTOR PERFORMANCE, PROBLEMS, AND OPPORTUNITIES

A. Performance Indicators and Analysis

1. ICT and the South Asia Subregional Economic Cooperation Program

2. The Asian Development Bank (ADB) has had a major role in supporting regional cooperation among Bangladesh, Bhutan, India, and Nepal through the SASEC Program since 2001.¹ With its growing importance in development, information and communication technology (ICT) was made a priority sector of phase II of the SASEC Program, which started in 2003. In 2005, the SASEC ICT Working Group (ICTWG) established under the SASEC Program developed with ADB's assistance² a SASEC ICT development master plan laying down the strategy, framework, and priorities for regional cooperation in ICT. The SASEC regional ICT strategy was intended to coordinate and consolidate the national leadership, vision, and strategies of the four countries for ICT. It proposed three most urgent areas for improvement in ICT: (i) cross-border connectivity, (ii) rural access to information, and (iii) human resource capacity. To address these needs, the SASEC countries agreed, at the third ICTWG meeting in Dhaka in September 2006, to develop the concept of the SASEC information highway, which would deliver and facilitate modern broadband information, communication, and knowledge services within and across borders to governments, businesses, research institutes, and rural and remote communities. ADB approved project preparatory technical assistance in November 2006 to give definite form to the project components.³ As designed, the Project will continue ADB's support for and commitment to regional cooperation in ICT.

2. Cross-Border ICT Connectivity in the Subregion

3. The cross-border ICT network in the subregion is fragmented and outdated. In many communities, affordable modern broadband services are not available although latent demand is high. All four SASEC countries are technically interconnected through fiber optics or microwave, but data communications are not direct and often go via third parties. This is because direct fiber-optic connections have insufficient capacity and regional exchange points and "peering" arrangements⁴ are nonexistent. The result is massive deployment of expensive

¹ The Program has been supported through ADB. 2000. *Technical Assistance for Identification and Prioritization of Subregional Projects in South Asia*. Manila (TA 5936-REG); ADB. 2003. *Technical Assistance for South Asia Subregional Economic Cooperation II*. Manila (TA 6010-REG); and ADB. 2005. *Technical Assistance for South Asia Subregional Economic Cooperation III*. Manila (TA 6297-REG).

² ADB. 2005. *Technical Assistance for South Asia Subregional Economic Cooperation Information and Communication Technology Development Master Plan*. Manila (TA 6232-REG).

³ ADB. 2006. *Technical Assistance for Preparing the South Asia Subregional Economic Cooperation Information Highway Project*. Manila (TA 6358-REG).

⁴ Traffic exchange between Internet service providers (ISPs) whereby larger ISPs with their own backbone networks agree to allow traffic from other large ISPs in exchange for traffic on their backbones, and also exchange traffic with smaller ISPs to reach regional end points.

satellite connection for Internet access in the landlocked countries of Bhutan and Nepal. Before country exchange points were established, even traffic within a country was exchanged overseas, generally through Hong Kong, China, and sometimes also through the United States.⁵ This network fragmentation has led to heavy overhead transit costs and ultimately to high user cost, and limited the full use and expansion of ICT-enabled services in the SASEC subregion. Because Internet traffic often goes via third parties, and overly relies on satellite transmission, connections in landlocked countries like Bhutan and Nepal cost much higher and are of lower quality. On the other hand, Bangladesh, recently connected to major submarine cables, cannot yet use the full capacity available to it and can therefore provide extra capacity to its neighbors. India, experiencing rapid growth in ICT penetration driven by private operators, is also increasingly supplying bandwidths to neighboring countries, but still does not fully meet the subregion's needs for high-quality, affordable, and reliable broadband. Regionally integrated and high-quality broadband capacity would keep local traffic local and optimize the cost of interconnection within the region, besides helping reduce the prices of ICT services to end users and boosting the growth in the use of ICT across borders.

3. Rural ICT Development

4. Commercially driven ICT development has left rural people behind and widened the disparity between the rural and urban areas. Rural community e-centers (CECs)—known variously as information kiosks, e-kiosks, village knowledge centers, or tele-centers—have been tested and have proved effective in addressing this issue. India's various rural CEC models and Bangladesh's Grameen village phone are pioneering and innovative examples of the use of ICT for rural poverty reduction. The CEC movement in India is now a national initiative, with the prospect of Internet connectivity in every village. Grameen Telecom in Bangladesh has become a major mobile operator and has extended the application of its microfinance model to Internet village kiosks in rural areas. CECs have been tried out for some years in Nepal and more recently in Bhutan, but these experiments have yet to achieve nationwide scale, under government or private leadership. Several hundred CECs are operated in Bangladesh and Nepal mostly by nongovernment organizations (NGOs) and the private sector, and a much smaller number in Bhutan, mainly by government and development agencies. In India, CECs exist in the tens of thousands, driven by a mix of large enterprises, entrepreneurs, universities, government, and NGOs.

5. Since computers and Internet connectivity are still too expensive for private ownership among the poor unlike mobile phones, which are becoming more affordable, CECs—shared facilities—are most useful in expanding rural ICT development. However, before CECs can become a mainstream means of communication, some challenges must first be dealt with: rural broadband connectivity, local content, and community capacity, as well as consolidated assistance for all three. Efforts to engage rural communities at the core of CEC programs have also been limited; the communities are considered unilateral beneficiaries of information services, instead of interactive local knowledge producers. To overcome these challenges and achieve the proven potential of CECs, rural CEC programs should evolve into village networks, wherein connected groups of villages generate, accumulate, and exchange information through village hubs. The regional approach will enable the SASEC countries to enhance their efforts to bridge the digital divide by sharing their experiences and connecting rural communities with one

⁵ Global exchange points and bandwidth markets are located in the East Coast of the United States (New York and Washington, DC); the West Coast of the United States (San Francisco Bay Area and Los Angeles); Europe (London and Amsterdam); and Asia (Hong Kong, China and Singapore).

another and with the rest of the world, and ultimately accessing the vast source of information, content, and services.

4. Human Resources Development in ICT

6. The need for more and higher-quality training in ICT has been expressed by all the SASEC countries including India, where ICT industry development has created millions of jobs over the past decades. They recognize the relationship between good-quality tertiary teaching and research, on the one hand, and staff retention, the brain drain, and ultimate industry development, on the other. The ICT education provided at present at most institutions in the subregion is mediocre. Except in certain public and private institutions of excellence, many ICT training initiatives do not meet international quality standards. While India has trained a large pool of skilled human resources in the ICT sector in the past few decades, it must upgrade their quality. Other SASEC countries are seriously constrained in mobilizing qualified human resources for ICT. Bhutan, for example, has only two higher institutions for ICT teaching/learning, Nepal has more than 30, and Bangladesh has more than 100, compared with India's thousands. The number of ICT professionals including the unqualified ranges from less than 400 (0.05% of the population) in Bhutan to more than 1 million in India (0.09%); Nepal has 6,000 (0.02%) and Bangladesh, 20,000 (0.01%). A regional approach to building human capacity through shared resources and improved national training and development support would enable the SASEC countries to capitalize on the opportunities in ICT.

B. Analysis of Key Problems and Opportunities

1. ICT and Economic Growth

7. Global communities and their economic activities, including regional and international trade, are increasingly being integrated through electronic means and technologies. ICT is fundamentally transforming the way we live, learn, and work, and it is crucial for inclusive growth that the benefits of ICT be shared by all. International experience reveals that ICT can be a key enabler for improving efficiency and productivity, creating new business opportunities, and enhancing competitiveness. ICT is thus as essential for economic growth as road and rail networks, and telephone and power systems.⁶ The quality and usefulness of ICT infrastructure therefore determines the efficiency of the economy and the potential for economic growth of the SASEC countries individually and as a group.

8. The SASEC countries acknowledge ICT to be a significant means for economic growth and have developed significant strategic policies consistent with established planning for ICT especially in relation to infrastructure, e-government, e-education, e-commerce, training and skills development, and ICT industry development. However, according to the ICT index (2004) of the United Nations Conference on Trade and Development (UNCTAD),⁷ measured by levels of ICT access, connectivity, and uptake, the overall ICT performance of the SASEC countries is low, although the dynamics of ICT development in each country are different. India led the SASEC countries, ranking 142nd, Bangladesh ranked 171st; Bhutan, 156th; and Nepal, 167th. These standings are partially attributable to the limited connectivity nationwide, although the effect of privatization and competition in mobile telephony in all SASEC countries has recently grown rapidly in tele-density. A detailed sector analysis is in Appendix 2.

⁶ ADB's independent Eminent Persons Group report (2007) urges ADB to add ICT-related infrastructure (such as fiber-optic cable networks and data banks) to its current definition of infrastructure.

⁷ United Nations Conference on Trade and Development. 2005. *Information Economy Report 2005*. New York.

2. ICT and Poverty Reduction

9. The ICT significantly contributes to poverty reduction. Chronic impoverishment particularly in rural areas, is often related to limited access to markets, employment opportunities, information, and access to public services as well as learning opportunities. Not only do farmers lack information but the limited information that's available is often rudimentary and outdated. For example, most farmers in South Asia still rely on information reflecting farming practices which are decades-old. More recent advances in farming, livestock, fisheries, and forestry technologies are not readily available to them even if they are available at the national level for lack of efficient information technology-based delivery systems. Rural communities remain substantially outside the reach of the enormous potential of ICT to improve the rural economy and well-being. Information is a powerful tool for strengthening social capital, most importantly, empowerment and participation, which are well recognized as a critical "soft" driver of socio-economic development and cultural change. Rural children have greater difficulty attending school, and when they do, they stay for shorter periods and leave with fewer qualifications, thus restricting their ability to further their skills, productivity, and income. The reach of public services, both health and education, is severely restricted due to limited ICT infrastructure, innovative program designs, and delivery systems.

10. The absence of services, remote physical conditions, and poor transport system leave rural people more marginalized. ICT holds great potential to address these challenges effectively and improve the wellbeing of poor people by enabling them to access (i) information about markets; prices and business opportunities, (ii) employment; information on employment and enterprise development, (iii) skills and education; delivery of both formal and informal e-learning, (iv) health care; innovative mechanisms for delivering health care and information, (v) government services; e-government for increased efficiency and transparency of public services, and (vi) empowerment; improved communications and channels for grievances. A number of new and innovative projects applying ICT to meet the needs of the poor have shown significant impacts on poverty reduction as shown in the box, which can be both direct and indirect.

11. Since 1990, the SASEC subregion has experienced rapid GDP growth, averaging 5.3 percent a year, contributing to significant poverty reduction. Most SASEC countries are on track to achieve the Millennium Development Goal (MDG) target for poverty reduction. However, they are off-track on the MDG targets for social development. Overall social development in SASEC countries is still marked by social inequalities and income disparities mapped on caste, religion, tribal and ethnicity dimensions. Therefore, providing equal and better opportunities to achieve more inclusive growth is essential to achieve progress in all the MDGs in the SASEC countries. ICT is recognized as a strategic means by all SASEC countries to promote not only faster but more extensive inclusive growth in a region which remains one of the least developed in the world.

Examples of ICT for Poverty Reduction

Grameen Village Phones, Bangladesh. The village phone program was initiated in 1997 by Grameen Telecom in cooperation with Grameen Bank. It works as an owner-operated pay phone supported by loans from Grameen Bank. The revenue growth has been very rapid –from Tk 0.53 million in 1997 to Tk2,070 million in 2003. The village phones now provide access to more than 60 million rural people. This has not only provided the rural poor with new exciting income-generating opportunities, but also given them unprecedented access to critical economic and other information and helped enhance the social status and empowerment of women from poor rural households.

Wireless Networking Project, Nepal. The project connected 14 villages in remote mountainous areas with Pokhara through wireless network since 2003 and expanded services including telemedicine, distance education, and telephone service, which enabled the rural communities to access public services at large cost savings and in a timely manner. Mahabir Pun, the team leader of the project has been awarded the Ramon Magsaysay Award 2007 for Community Leadership by the Ramon Magsaysay Foundation in Manila for this innovative “home-grown” project based on the needs of the rural communities.

Akshaya and Mallapuram Districts (Kerala), India. It is a joint project between local bodies (*gram panchayats*) in rural areas and municipalities in urban areas and private entrepreneurs in Mallapuram district of Kerala initiated in 2001. The objective is to “bridge the digital divide” by providing community access to computers and the Internet. About 565 community technology centers have been established in the district. Akshaya operates public-private partnerships in establishing the community technology center in remote villages.

Bhoomi Project, Bangalore (Karnataka), India. The Department of Revenue of Karnataka has computerized 20 million land ownership records of 6.7 million farmers in the state. Each record is available online from 177 taluka kiosks at a cost of Rs15 per record. The project has been widely acclaimed as possibly the most successful ICT project for land records in the country.

E-Choupal, Ujjain (Madhya Pradesh), India. This web-based initiative of Indian Tobacco Company’s international Business Division in Central India provides soya growers with information, products, and services they need in soya farming. The kiosks facilitate the supply of high-quality farm inputs and purchases of soya at the doorsteps of the villagers. This project started in 42 villages of Ujjain district, with around 1,800 kiosks in Madhya Pradesh, and now has around 3,300 kiosks in Central India. The kiosks also handle dealerships for various commodities such as cycles and tractors. This feature has also minimized the travel expenses of the villagers.

Tarahaat.com, Jhansi (Uttar Pradesh), India. Development Alternatives (with the help of 12 project partners) started the project in four districts of North India as a business model to cater to the unserved rural markets. The project provides services like Tarabazaar (e-bazaar), Taravan (mobile kiosks), Taraguru (e-education), Taradhaba (cyber café), Tarareporter (news), Taradak (e-mail), Taravendor (e-commerce), and Taracard (e-greetings). Franchisee kiosks are provided with connectivity through C-band satellite, VSAT, or dial-up modem, according to the infrastructure available.

Mobile Remittance Service, Philippines. The mobile remittance services introduced by Philippine operators in recent years have proven highly successful for all parties concerned: the operators are taking commissions on cash transfers upwards of \$100 million per day, while expatriate Filipino workers are sending money home to their families faster, more cheaply, and more securely than previously possible. This is known as a good business development case for other mobile operators and development agencies to benchmark.

ICT = information communication technology, Rs = rupees, Tk = taka, VSAT = very small aperture terminal.

Sources: United Nations Development Programme. 2006. *Empowering the Poor: ICT for Governance and Poverty Reduction*. UNDP-APDIP ICT4D Series; Nepal Wireless Networking Project, ERND, 2006; Global Technology Forum, April 2007.

3. ICT and Regional Cooperation

12. In the SASEC context, a cross-border terrestrial ICT network, aided by regional exchange points, peering arrangements, and a competitive access regime, is essential to regional ICT cooperation. The idea behind building such a regional network is to keep local traffic local, and thus optimize the cost of interconnection within the region. It is economically critical that the region have sufficient and efficient connectivity to allow for growth in the use of ICT. In this regard, the SASEC regional network would contribute to reducing user costs across

borders, facilitate ICT-enabled business development, and increase the quality of service by effectively managing real-time traffic data, congestion, interoperability, peering, and redundancy, while facilitating data traffic trades across borders. The plan of action developed by the World Summit on the Information Society (WSIS) recommends that efforts be made to reduce the international Internet costs charged by backbone providers by developing regional ICT backbones and Internet exchange points, thereby reducing interconnection cost and extending network access.

13. Such a SASEC regional network would enable SASEC countries to take a SASEC regional approach to the communities and establish regional connections between the village networks of the individual countries, thereby delivering local solutions not only within connected communities in one country but also in communities in other SASEC countries that are connected to the regional network. Local networking and local information sourcing from within rural communities would be a powerful driver for ICT use in the rural context. For example, information sought by one village contact would be provided to every relevant village in the block, district, state, country, or region. Through this network, every village would be a “peer” to other villages and could learn what all other rural communities are learning and experiencing daily. The principal sources of information, news, opinion, and discussion within the network should be the villages themselves, through the experiences of their own peers.

4. ADB Regional Cooperation Strategy

14. ADB’s South Asia Regional Cooperation Strategy and Program (RCSP) for 2006–2008 sets out five key operational objectives: to improve connectivity, to facilitate trade and investment, to develop regional tourism, to facilitate cooperation in energy, and to promote private sector cooperation. Improving transport and communications connectivity is expected to reduce transportation and communication costs, increase South Asia’s competitiveness, and facilitate the movement of goods and people, thereby promoting economic and social development. To this end, the RCSP strongly supports the connectivity enhancement of key modes of transport and communications. Also according to the RCSP, ADB experience shows that improvements in connectivity are critical to progress in other areas, such as trade and investment, and tourism. ICT being basic infrastructure for electronic services and transactions, the Project can be expected to contribute to promoting synergies with other regional cooperation activities in trade and tourism development.

5. Lessons Learned

15. A key challenge for the Project is scaling up and replicating successful ICT methodologies and mechanisms developed locally, to foster local innovative and entrepreneurship. The following essentials of creating an enabling environment for community-driven networks have been identified and incorporated into the project design:

- (i) a national policy that acknowledges community ownership and supports the creation of an environment toward that end;
- (ii) a regulatory environment that allows the deployment of the most appropriate and cost-effective technologies with minimum hindrance, and that governs interactions with others (e.g., for interconnection) in a manner that promotes network growth in poor rural communities and recognizes their value;

- (iii) innovative measures to support financing and investment, both local and external, in cooperatives and community-driven networks, recognizing the social and development value of these ventures to the communities, as well as their lack of appeal to private investors; and
- (iv) positive actions to build the capacity of communities to initiate their own network and service enterprises and to maintain and expand them, and to encourage and enable strong pro-poor community-driven governance of other networks and services provided in their areas.

6. Policy Dialogue

16. Policy dialogue will be continued under the SASEC ICTWG platform, focused on ensuring the sustainability of the Project and keeping a primary focus on ICT in the context of the MDG achievements in the following areas:

- (i) **Technology neutrality in service provision and regulation framework.** The distinction between voice and data, while disappearing in technology, retains a strong policy influence in the region and separates what is technically possible from what is accepted in practice. Therefore, policy dialogue will be continued, to increase technology neutrality for the maximum use of the regional network and available technologies.
- (ii) **ICT-enabled regional applications and services.** Enhanced connectivity between the SASEC countries should strengthen regional cooperation and integration through public and economic service applications, village development, and ICT commerce and industry. Policy dialogue will be carried out on the use of the regional network to serve the needs of rural communities, business, and research and training institutes across borders.
- (iii) **Human resource development in ICT.** Various levels of human resource are required to engage in ICT research and development, to manage regulatory regimes that maximize the community and economic benefits of ICT, and to design new service applications to engage with rural communities. Policy dialogue will pursue regional cooperation in human resource development and expanded local innovations throughout the region.

III. THE PROPOSED PROJECT

A. Impact and Outcome

17. The Project is aimed at enhancing the benefits of ICT and regional cooperation for inclusive growth and poverty reduction by increasing the supply of affordable broadband, skilled ICT manpower, and local content and e-applications, with a special focus on the needs of the poor. It is also expected to help SASEC countries improve their productivity and efficiency and participate more fully in the global information economy. To this end, the Project will establish (i) a SASEC regional network with fiber-optic and data interchange capacity, directly connecting the four SASEC countries; (ii) a SASEC village network expanding broadband ICT access to 110 rural communities in the SASEC countries and providing direct connections among the communities for local networking and local information sourcing; and (iii) a SASEC research and training network to build technical and business skills in developing local ICT content and

e-applications (e-government, e-learning, tele-medicine, e-remittance, e-commerce, etc.) that serve the needs of the poor in particular.

B. Outputs

1. SASEC Regional Network

18. The SASEC regional network will consist of (i) the extensive existing broadband network owned by telecom service providers in each country, to be interconnected under the Project; (ii) a new fiber-optic network to be built in Bangladesh, Bhutan, and Nepal; and (iii) four access gateways at specific sites in each country, linked to the border township within each country for connectivity to the other countries. The SASEC regional network will be designed to (i) provide a scalable data-peering network among SASEC member countries, (ii) provide SASEC member countries with access to good-quality landed-port Internet access from both India and Bangladesh, (iii) provide cross-border data-peering access to reduce expensive international transit peering, (iv) help generate traffic flows and applications throughout the region as well as in-country, (v) make broadband services more accessible to rural and remote communities via wireless connectivity to CECs, and (vi) maximize the use of existing infrastructure in each country to minimize investment costs.

a. Fiber-Optic Network

19. In Bangladesh, the Bangladesh Telegraph and Telephone Board and the Power Grid Company of Bangladesh Ltd.—both has fiber-optic cables to the northern town of Panchagarh. But no fiber-optic cables are available from Panchagarh to the border point of Banglabandha, through which the SASEC regional network will be connected to the identified Indian location of Fulbari. A new fiber-optic cable of about 55 kilometers (km) will therefore be laid from Panchagarh to Banglabandha in Bangladesh. In Bhutan, Bhutan Telecom Ltd. has a fiber-optic link from Thimpu to Phuentsholing via the transmission network grid of Bhutan Power Corporation Ltd. A 140 km alternative fiber-optic route from Thimpu to Phuentsholing via a second power transmission route of the Bhutan Power Corporation Ltd. will provide a redundant (self-healing ring) national network from Thimphu to Phuentsholing.

20. In India, two carriers—Bharat Sanchar Nigam Limited and Reliance Communications—have international long-distance licenses to permit cross-border access. Bharat Sanchar Nigam Limited is the incumbent carrier and has most of the required links to the SASEC neighbors. No new investment in a fiber-optic network is required in India. In Nepal, Nepal Telecom has a fiber-optic link from Hetauda to Biratnagar via underground ducts (pipes) and manholes. A 433 km alternative fiber-optic route from Hetauda to Biratnagar via the Nepal Electrical Authority transmission power grid network will be laid under the Project to provide a redundant (self-healing ring) national network from Hetauda to the town of Biratnagar.

b. Access Gateways and Border-Connectivity Townships

21. Dhaka in Bangladesh, Thimpu in Bhutan, Shiliguri in India, and Kathmandu in Nepal have been selected as country access gateways under criteria specifically drawn up to optimize the functionality, cost, security, and marketability of the SASEC regional network. The criteria are (i) existing co-locations; (ii) potential for building access to other operators; (iii) security of access; (iv) availability of power and backup, air conditioning, rack space, and sufficient space for future expansion; and (iv) resilience to flooding and earthquake. A gateway core router and management devices and software will be installed in each access gateway.

22. The border-connectivity townships are effective strategic cable landing points in each SASEC country. The border town or junction location becomes a focus for improving connectivity and developing further capacity that can (i) be carried to the in-country access gateway, (ii) provide further benefits to the cross-border town, and (iii) provide strategic national cable routes and valuable rural connection drop-off points along the link between the border town and the access gateway. These seven border-connectivity townships were selected: (i) Pancharghar in Bangladesh; (ii) Phuentsholing in Bhutan; (iii) Shiliguri, Jogbani, Fulbari, and Jaigaon in India; and (iv) Biratnagar in Nepal. Border core routers and equipment will be installed in the three landing stations of Pancharghar, Phuentsholing, and Biratnagar.

2. SASEC Village Network

23. The village network requires a central hub supported by an information exchange that constantly collects, standardizes, and redistributes traffic generating community information from all participating villages across the country through a village intranet. A SASEC village network will be established under the Project. Five to six hub CECs will be built in each SASEC country, and five spoke CECs branching from each hub will be connected to the SASEC regional network. This will enable local networking and local information sourcing from within rural communities across borders and thereby drive rapid ICT uptake by the rural communities. Also, the exact local needs and opportunities for ICT use in various information services can be identified and fed to the management of the SASEC regional network. The component will support (i) the establishment of a rural wireless broadband network; (ii) the development of a portal service (voice, chatting, video conferencing, e-mail, community bulletin, etc.) and a knowledge database management system; and (iii) the establishment of 110 CECs in the four SASEC countries, linked to the SASEC regional network.

24. The SASEC village network will enable CECs in the villages to become access points for interaction with the SASEC regional network, and thereby enable the CECs themselves to operate as hubs for other CECs in the local area. Villages, once connected to the SASEC village network, will be able to generate and maintain information that SASEC rural communities, via CECs, can interact with and add to, using the SASEC regional network as the delivery mechanism. The SASEC portal will improve access to local content and information through the use of multimedia, and facilitate indigenous knowledge management within and among the communities.

3. SASEC Research and Training Network

25. The SASEC research and training network will promote regional knowledge sharing and innovation by building human resource capacity and supporting local ICT start-ups. The research and training network will therefore serve as a SASEC regional ICT knowledge network providing teaching, research, and professional development support for local innovation and entrepreneurship. Local entrepreneurs, aided by the research training network, will create local content for regional e-business and e-services (for example, tele-medicine, e-learning, e-remittance, e-commerce) to be delivered over the SASEC regional network and the SASEC village network. To this end, the Project will establish a research and training center in a selected ICT research institute in each of the SASEC countries by providing (i) connectivity to the SASEC regional network, (ii) support for faculty mobilization and space rental, and (iii) ICT development support. The research and training centers will (i) develop and conduct research and training in e-business development and ICT professional development, for service delivery to the rural communities through the SASEC village network and CECs; and (ii) develop open

content and training programs in ICT professional development. This research and training network will be financed separately by the TA attached to the Project (see paras. 49–52).

C. ADF IX Grant Component

26. Bhutan and Nepal were among the poorest countries identified as eligible for Asian Development Fund (ADF) grants in the ADF IX resolution.⁸ In view of the considerable social development impact of the Project and the tight fiscal situation of the governments of the two countries, the project components for Bhutan and Nepal should be eligible for 100% grant financing as prescribed in the draft Board policy paper titled “Revising the Framework for Asian Development Fund Grants.”

D. Special Features

27. The Project is designed to encourage the maximum participation of the private sector and to promote public-private partnership in the operation of the SASEC networks (regional network, village network, and research and training network) to achieve social, economic, and financial sustainability. For this purpose, various agreements setting the terms and conditions of the network operations will be designed to ensure (i) the use of the existing cross-border infrastructure, and (ii) the establishment of a framework and cash flows between network operations and social programs.

28. The Project is also designed to maximize synergy and complementarities among the three components—regional network, village network, and research and training network—by interconnecting the functions and requirements of these network operations. The SASEC regional network will provide direct connectivity within SASEC rural communities and between these communities and SASEC research and training centers. The SASEC research and training network will provide training programs and development support on the basis of the needs of rural communities and entrepreneurs identified through the SASEC village network. This arrangement enables direct communications between end users and service providers and thereby encourages community-based or community-driven innovations, leading to the development of local content and e-applications that are more relevant to the needs of the poor in rural areas.

E. Project Investment Plan

29. The project investment cost is estimated at \$24.0 million, including taxes and duties of \$2.7 million, as shown in Table 1. The detailed cost estimates are in Appendix 3.

⁸ Eighth Replenishment of the Asian Development Fund and Third Regularized Replenishment of the Technical Assistance Special Fund.

Table 1: Project Investment Plan
(\$ '000)

Item	Amounts ^a				
	Total	BAN	BHU	IND	NEP
A. Base Cost^b					
1. SASEC Regional Network	16,540	2,520	3,920	1,320	8,780
2. SASEC Village Network	2,750	620	750	630	750
3. Project Management Consultant	2,100	550	550	450	550
4. Administrative Support	320	80	80	80	80
Subtotal (A)	21,710	3,770	5,300	2,480	10,160
B. Contingencies^c					
1. Physical	2,140	370	520	240	1,010
2. Price	110	20	30	10	50
Subtotal (B)	2,250	390	550	250	1,060
C. Interest During Construction	40	40	0	0	0
Total (A+B+C)	24,000	4,200	5,850	2,730	11,220

BAN = Bangladesh, BHU = Bhutan, IND = India, NEP = Nepal.

^a In mid-2007 prices.

^b Includes taxes and duties of \$2.7 million.

^c Physical contingencies computed at 10% of base cost except for administrative support and price contingencies at 0.8% on foreign exchange costs and local currency costs.

Source: Asian Development Bank estimates.

F. Financing Plan

30. It is proposed that ADB provide grants of \$4.7 million for Bhutan and \$9.0 million for Nepal, and a loan of \$3.1 million for Bangladesh from its Special Funds resources, to finance 70% of the project cost. The governments of the SASEC countries will finance \$7.2 million, or 30%. The governments of Bhutan and Nepal will finance only the taxes and duties and contingencies, while the Government of Bangladesh will finance some part of the base cost as well. All the SASEC governments have expressed their capacity and willingness to provide the required counterpart financing. The ADF loan to Bangladesh will be denominated in special drawing rights, and will have a term of 32 years, including a grace period of 8 years, and an interest rate of 1% per year during the grace period, and 1.5% after that. Table 2 shows the financing arrangement by country. The detailed financing plan is in Appendix 3.

Table 2: Financing Plan
(\$ million)

Source	Total		BAN		BHU		IND		NEP	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Asian Development Bank	16.8	70	3.1	75	4.7	80	0	0	9.0	80
Government	7.2	30	1.1	25	1.2	20	2.7	100	2.2	20
Total	24.	100	4.2	100	5.9	100	2.7	100	11.2	100

BAN = Bangladesh, BHU = Bhutan, IND = India, NEP = Nepal.

Source: Asian Development Bank estimates.

G. Implementation Arrangements

1. Establishment and Operation of Networks

a. SASEC Regional Network

31. The SASEC regional network will be built by connecting existing broadband networks owned by current telecom service providers in each country. All SASEC countries will select a service agency from eligible telecom service providers in each country to provide the necessary fiber-optic network and be responsible for operating the SASEC regional network jointly with the service agencies in the other SASEC countries. India will select its service agency on the basis of the availability of (i) an international long-distance license to carry traffic to and from other countries (carriers with national long-distance licenses and adequate infrastructure for cross-border traffic could form a consortium with the international long-distance license holder to qualify), (ii) a fiber-optic network that satisfies SASEC regional network design specifications and that can be upgraded with the least amount of capital expenditure, (iii) reliable access and expandable capacity to the SASEC border locations from Shiliguri, (iv) reliable access and haulage to Internet capacity at landing stations from Mumbai and Chennai, (v) right-of-way, and (vi) support for next-generation network technology.

32. The three other SASEC countries will select their own service agencies on the basis of the availability of (i) a national fiber-optic network with reliable and expandable capacity, (ii) right-of-way, (iii) a fiber-optic route that favors the location of wireless sites to link rural CEC networks, and (iv) support for next-generation network technology. Service agencies will be selected through open tender (for countries with more than two eligible candidates) or closed tender (for countries with no more than two eligible candidates). Each tender will be based on technical and financial capability to deliver the desired solution within a country's borders and across the borders of other countries.

33. The organizational operational structure of the SASEC regional network will be established by three layers of multilateral and bilateral agreements among and between SASEC countries. The multilateral cooperation network agreement, which will be signed by the executing agencies (EAs) in all SASEC countries, will set the overall framework and guidelines for the operation of the SASEC regional network. The service agency agreement will be made between the EA and the service agency in each country, and will set out the details of the public-private partnership arrangements by setting the terms and conditions for the service agency to build, keep, manage, and operate the network and equipment as designed, built, and installed under the Project and serve the requirements of the SASEC regional network.⁹ The role of the EA, i.e., the public sector, will be limited to supervising the service agencies, which will have a key role in jointly operating and maintaining the regional network through bilateral interconnection agreements. The bilateral interconnection agreement, which will be made between service agencies of two countries, will set the terms and conditions for the interconnection of, and the exchange of digital traffic between, the countries' in-country networks including technical specifications of networks and maintenance, and spell out the mechanism for revenue and cost sharing. Six bilateral network agreements will be signed among the four SASEC countries.

⁹ The agreement will include a clause that requires the selected service agencies to contribute a certain portion of their revenue accrued from the SASEC regional network to support the financial sustainability of the SASEC village network and the SASEC research and training network.

b. SASEC Village Network

34. The operation of the SASEC village network and CECs will be franchised to private entrepreneurs such as rural Internet service providers (ISPs) or NGOs that were involved in similar CEC operations. The village network and operation might be franchised through auction, lease, or other appropriate means; auction is the widely adopted means, to ensure both the financial sustainability of the village network and the CECs and the social responsibility of the franchisees. The potential service agencies, in the course of bidding, might indicate the need for financial support in case the CECs they bid for are assessed to be financially unviable. The EA will select a service agency that has offered the highest price or the lowest financial support for the operation of a package of CECs and the village network. If the EA should pay for financial support as a result of a bid, it would be financed by the resource pool that would be established from the contributions of the service agencies of the SASEC regional network. The agreement for village network operation between the EA and a selected service agency will prescribe the social responsibility of the franchisees by specifying the minimum services to be provided to the communities, particularly the poor and the women, and the need for financial assistance from the EA to ensure the financial sustainability of the CEC operation. This social responsibility model is based on best practices tested and now being used more widely in India.

c. SASEC Research and Training Network

35. The service agencies in the four countries will be selected from capable potential ICT research institutes including universities and will act as focal implementing agencies of the network. The selected service agencies will be provided with connectivity to the SASEC regional network and the necessary equipment, and will be required to provide regional research and training services as prescribed in the service agency agreement, making use of their own expertise and human resources, and assistance provided to them for additional faculty compensation, space rental, content development training courses, and ICT development. The service agencies will operate the research and training network by developing and conducting research and training programs in e-business development and ICT professional development, and by providing development support to small and medium ICT start-ups, through which the service agencies will accrue financial revenues to ensure the financial sustainability of their network operation.

2. Project Management

36. The Ministry of Science and Information and Communication Technology of Bangladesh, the Ministry of Information and Communication of Bhutan, the Department of Information Technology of the Ministry of Communications and Information Technology of India, and the Ministry of Information and Communication of Nepal will be responsible for implementation of the Project as its EAs. A steering committee, consisting of the secretaries of the EAs, will jointly supervise and monitor overall project implementation. It will also provide overall guidance to the project management units to be established under the EAs in coordinating joint activities, and clear the draft multilateral cooperation agreement, bilateral interconnection agreements, and service agency agreement for the transfer of network and equipment and their operation, for signing.

37. A project management unit (PMU), headed by a project director (joint secretary) and with a technical expert (project manager), an administrative staff, and a representative of each service agency as members will be established under each EA. It will be responsible for the day-to-day implementation of the Project in coordination with the project management

consultants. The PMU will (i) recruit the country project management consultants in consultation with ADB; (ii) supervise and monitor the work of the country project management consultants; (iii) maintain the project accounts, endorse the invoices of the project management consultants, and prepare withdrawal requests for payment to contractors; (iv) prepare the statement of expenditure for the replenishment of the imprest account, and prepare the yearly financial statement for the project account and have it audited by an external auditor; and (v) report monthly on the progress of the implementation to the steering committee and ADB. The implementation arrangement is in Appendix 4.

3. Implementation Period

38. The Project will be implemented for 21 months, from April 2008 to December 2009. The project implementation schedule is in Appendix 5.

4. Procurement

39. Goods, services, and civil works to be financed under the ADB grant or loan will be procured according to ADB's *Procurement Guidelines* (2007, as amended from time to time). Network design and installation contracts will be procured according to the procurement plan (see Appendix 6).

5. Consulting Services

40. Project management consultants will be hired to assist the EA in implementing the Project. The project management consultant team will consist of (i) an international team comprising a team leader, a design engineer, and a procurement specialist; and (ii) four country teams. Each country team will have three subteams: a SASEC regional network team, a village network/research and training network team, and a joint team. Each of the first two subteams will comprise a team leader, a design engineer, a procurement specialist, and a network engineer. The joint team will consist of a social development specialist, an environment specialist, and a quality assurance specialist. A firm of international consultants will be hired for 36 person-months, and a firm of national consultants, for 100 person-months in Bangladesh, Bhutan, and Nepal, and for 63 person-months in India. The project management consultants will (i) design all networks to be procured under the Project; (ii) prepare bid documents; (iii) assist the PMU in tendering (prequalification, evaluation of proposals, etc); and (iv) supervise contractors. The outline terms of reference for the project management consultants are in Appendix 7.

41. The project management consultants will be selected and hired according to ADB's *Guidelines on the Use of Consultants* (2007, as amended from time to time) through quality- and cost-based selection (80:20) and simplified technical proposal. ADB will consider approving advance recruitment of consultants on the understanding that such action will not necessarily commit ADB to financing the Project.

6. Anticorruption Policy

42. ADB's *Anticorruption Policy* (1998, as amended to date) has been explained to and discussed with the governments of the SASEC countries. Consistent with its commitment to good governance, accountability, and transparency, ADB reserves the right to investigate, directly or through its agents, any allegations of corrupt, fraudulent, collusive, or coercive practices relating to the Project. To support these efforts, relevant provisions of ADB's

Anticorruption Policy will be included in the grant regulations and the bidding documents for the Project. In particular, all contracts financed by ADB for the Project will include provisions specifying the right of ADB to audit and examine the records and accounts of the EAs and all contractors, suppliers, consultants, and other service providers as they relate to the Project. The Government will also allow ADB's representatives to carry out random spot checks on the work in progress and the use of funds for the Project, and assist them in doing so.

43. The SASEC ICTWG, a continuous ICT coordinating body composed of the secretaries of the ICT ministries in the SASEC countries, will oversee and monitor the procurement of contractors and the selection of service agencies to ensure transparency and good governance. The country representatives will be required to present at a SASEC ICTWG meeting their tendering processes for the procurement of contractors and the selection of service agencies including the criteria for prequalification and tender evaluation. While examining the tender processes of each country, the SASEC ICTWG may propose supplementary and complementary measures to enhance transparency and good governance.

7. Disbursement Arrangements

44. Grant and loan funds will be disbursed according to ADB's *Loan Disbursement Handbook* (2007). Statement-of-expenditure procedures will be used in reimbursing eligible expenditures.

8. Accounting, Auditing, and Reporting

45. Each EA will maintain separate accounts and records for the Project according to sound accounting principles, adequate to identify the goods and services financed from the grant proceeds, the financing resources, the expenditures incurred for the Project, and the use of local funds. These project accounts and related financial statements will be audited annually according to sound auditing standards by independent auditors acceptable to ADB. The EAs will submit to ADB the audited project accounts no later than 6 months after the end of the fiscal year. The annual audits will include an audit of the statement-of-expenditure records, and a separate opinion on the audit. The Government has been advised of ADB's requirement of timely submission of audited project accounts and financial statements, and the suspension of disbursements of the proposed ADB grant or loan if the requirement is not complied with.

46. Each EA will submit quarterly progress reports to allow performance to be monitored, issues to be resolved, and periodic action plans to be prepared. The quarterly reports will serve as feedback for updating and improving procedures and project implementation. Within 3 months of the physical completion of the Project, each EA will submit a project completion report on the overall impact of the Project.

9. Project Performance Monitoring and Evaluation

47. The EAs will be responsible for overall project monitoring. The PMUs will establish a system for preparing monthly progress reports for performance monitoring and issue resolution, plus periodic action planning. The EAs will monitor the quantitative and qualitative performance of each project component and evaluate the delivery of the planned facilities and the project benefits accrued. With the help of the project management consultants, each EA will develop, no later than 3 months after the loan or grant takes effect, a comprehensive system for monitoring the Project's performance. ADB will review and approve this system. ADB and the

EAs will agree on the performance parameters to be monitored during the implementation of the Project and for 3 months after project completion.

10. Project Review

48. ADB staff will review project implementation through regular or special review missions. According to the project schedule, a midterm review will be carried out about 12 months after the start of the Project, around April 2009. Before the midterm review each of the four governments will submit to ADB a detailed progress report on the Project's implementation and achievements. The terms of reference for the midterm review will be included in the project administration memorandum to be prepared by ADB's Inception Mission for the Project.

IV. TECHNICAL ASSISTANCE

49. Infrastructure provision alone will not serve the purpose of the Project. Without facilitation of content, services, and capacity, such infrastructure will quickly become unsustainable. Therefore, the piggybacked TA is aimed at strengthening the functioning of the infrastructure by building the related human capacity, not only in hard engineering technologies but also in soft business management and development technologies required to operate, manage, and use the SASEC regional network and the SASEC village network. The TA will also contribute to reshaping the role of the ICT research institutes in knowledge development and ICT-related capacity building for community and business development. It will generate regional and national e-businesses and services (public and private), in the course of the sustainable provision of the SASEC information highway infrastructure. It will also support local entrepreneurs and ICT start-ups in facilitating better public and private services to rural communities. In the long term, the TA, together with the improved connectivity through the mother project, will contribute to inclusive growth by empowering those who have been excluded from the economic and social development activities of the countries. The design and monitoring framework of the TA is in Appendix 8.

50. The proposed TA will develop these four dimensions of the SASEC research and training network: (i) incorporating regional and community priorities on, and need for, ICT skill and business development into the core activities of the ICT institutes; (ii) establishing partnerships, linkages, and interactions with the regional communities and businesses through the research and training network; (iii) enhancing the subregional knowledge pool and resources for the capacity development of ICT professionals and entrepreneurs for long-term sustainable operation; and (iv) promoting research and development on e-business, e-applications, and e-services to be delivered through the SASEC regional network and the SASEC village network, for the greater benefit of the community and business creation.

51. The TA will assist four SASEC research and training centers in carrying out the following activities for ICT skill and business development: (i) providing research and training programs for in-country and regional needs, wherever possible; (ii) allocating an appropriate proportion of the institutes' research to ICT-related subjects that are relevant to regional priorities and address contemporary issues with a direct impact on the communities they serve; (iii) taking leadership in a range of interactions with the communities through ICT-related consulting and professional services; (iv) maintaining connections with other bodies throughout the SASEC region that are relevant to the centers' vision and mission in regional and community ICT research and training interaction; (v) promoting the use of institute facilities among the general community and businesses; (vi) using a distinctly capable ICT infrastructure and associated environment for promoting knowledge-based development via the

interconnection with the SASEC regional network and back-to-back interconnection with CECs; (vii) collaborating with other ICT research institutes and training providers in the region that are interested in ICT-related services, to accrue mutual benefits; (viii) creating a centralized information and database that integrates all CECs under the Project as a focal point for information dissemination throughout the region; and (ix) using the SASEC regional network as a primary connectivity gateway for delivering services to the wider community and industry.

52. The total cost of the TA is estimated at \$4.4 million, to be financed on a grant basis from ADB's Regional Cooperation and Integration Fund. The cost estimates and financing plan for the TA are in Appendix 9. The project management consultants to be hired for the Project will design the research and training network for connectivity to the SASEC regional network and selected ICT research institute in each country; procurement will be according to the procurement plan (see Appendix 6). The TA will be implemented over 45 months, from April 2008 to December 2011.

V. PROJECT BENEFITS, IMPACT, ASSUMPTIONS, AND RISKS

A. Poverty and Social Development Impact

53. Poverty is often found significantly related to a lack of knowledge and information; ICT can improve effective access to such knowledge and information. Rural poverty rates in the SASEC countries range from 20% to 42%: 20% in India; 35%, Nepal; 40%, Bangladesh; 42%, Bhutan. More than two thirds of the rural population in the countries subsists on agriculture (including livestock) and forestry. Rural farmers rely on rudimentary and outdated information about farming practices and have limited opportunities to market their agricultural products. The Project will contribute to addressing such challenges by improving rural ICT connectivity and human capacity to use the vast information and knowledge resources and e-services related to agriculture, market, employment, health care, education, and government services that are available on the Internet. The Project will also enable the integration of rural communities for local networking and local information sourcing. Rural people will thus have better opportunities to create and use local knowledge for improved empowerment and livelihood. A summary poverty reduction and social strategy is in Appendix 10.

B. Environment and Social Safeguards

54. The Project involves the identification of co-location facilities, in-country and cross-border links, and village network locations. Its design is based on the use of the existing telecommunication infrastructure in each country. The co-location sites (network access gateways), one in each country, will be identified on the basis of the availability of requisite space, facilities, and connectivity to in-country links. The in-country and cross-border links identified will have requisite connectivity between the access gateway and the border-connectivity townships, right-of-way, and access to the links. The border-connectivity townships will also have connectivity to India's border township, either through existing infrastructure or a new facility established without causing significant environmental impact. The identification of the CECs will consider the availability of space and the requisite facilities. Physical interventions for the project components will therefore be limited. As such, the Project is classified as category C according to ADB's environmental impact assessment requirements (2003). Environmental impact was nonetheless assessed through the environmental assessment approach to ensure that the Project will have no significant environmental impact (the summary report on this assessment is in Appendix 11).

55. The development of CECs and cross-border links between India and Bangladesh is the only project activity that is likely to generate (very minor) disturbance. However, some impact during operation, especially associated with the disposal of office and e-waste, which is recyclable, and domestic sewage, which can be fully treated, is also foreseen. The implementation of the mitigation measures provided in the environment management plan will minimize the predicted disturbance during design and development and during operation. Developing the CECs, setting up wireless connectivity poles, and developing cross-border links between Bangladesh and India may require cutting a few trees, obtaining access, or acquiring as well as clearing additional land along the road. Although the development of CECs and wireless connectivity was not found to involve any forest areas or protected forest, any required felling of trees or diversion of forestland will be carried out only with and in line with the environmental protection laws of the country concerned.

56. By using the existing infrastructure the Project will avoid any private land acquisition and resettlement. CECs will be established in existing village administration buildings. Similarly, the structure for the data center will be built on government land within the premises of the ISPs; and the fiber-optic cables will be laid along existing power transmission lines or telecom lines or on government land. No adverse impact on private properties or communities in the region, including indigenous peoples, is envisaged.

C. Economic Analysis

57. The economic analysis of the Project conformed to ADB's *Guidelines for the Economic Analysis of Projects*. To estimate the economic internal rate of return (EIRR) of the Project, the project case was compared with a base case involving the continued use of satellite transmission. The regional network will connect the cable landing stations (CLSs)¹⁰ in Bangladesh and India to an access gateway, and then distribute Internet capacity to Nepal and Bhutan via terrestrial links. The economic benefits include: (i) savings accruing to Nepal and Bhutan on the cost of connecting to Internet service as a result of the installation of the SASEC regional network, and (ii) incremental revenues to be earned by India and Bangladesh from payments by Nepal and Bhutan for the CLS connection. Other economic indirect benefits over time include increased incomes and economic activities resulting from improved access to information and markets. For example, improved and more affordable broadband access to the Internet resulting from the Project will also boost the development and consumption of ICT and thereby increase economic productivity and efficiency. But these benefits are hardly quantifiable and were not included in the analysis.

58. Without the Project, Nepal and Bhutan, which are currently not connected to any CLS, have to depend on satellite transmission, in particular very small aperture terminals (VSATs), to gain access to the Internet. VSAT access is generally twice as expensive as access through CLS terrestrial links. At present, VSAT access costs about \$1,500 per megabyte (MB) per month. Nepal is allocated a maximum of 200 MB of VSAT access capacity and Bhutan, 40 MB. With the Project, Nepal and Bhutan will have a better option: instead of relying on expensive satellite access to the Internet, they will attain bigger Internet access capacity through CLSs, with negotiated payment of operation fees to India and Bangladesh of about \$850 per megabyte per month. The Internet access capacity that Nepal and Bhutan can purchase will be at least about three times as large, amounting to a total of 775 MB per month—620 MB for Nepal and 155 MB for Bhutan.

¹⁰ The location where a submarine or other underwater cable makes landfall.

59. The economic life of the SASEC regional network and the SASEC village network was assumed to be 15 years, and the residual value to be 10% of the acquisition cost. The operation and maintenance costs for the fiber-optic cables were assessed at 2% of the installation cost per year, and for computer equipment at 3% for the first 3 years, increasing by 100 basis points every 3 years as the equipment ages. All cost elements were valued at border prices, using a world price numeraire, with all taxes and duties excluded. A standard conversion factor of 0.9 was applied to non-tradable items and labor.

60. The overall EIRR of the Project is estimated at 34.3%. The sensitivity of the EIRR was tested for cases when (i) no indirect benefits are included; (ii) the project benefits are reduced by 20%; (iii) the project cost increases by 20%; and (iv) cases ii and iii combined. In each case, the EIRR remains robust at the level of 31.9%, 27.6%, 28.7%, and 22.7%, respectively. Details of the economic analysis are in Appendix 12.

D. Risks

61. The successful implementation and operation of the project facilities will depend largely on multilateral and bilateral agreements among the SASEC countries. Any difficulty or procrastination in signing those agreements will delay or otherwise hamper the implementation and operation of the facilities. ADB will facilitate the signing of the agreements through continued monitoring and support for the SASEC ICTWG.

62. As the SASEC village network and the research and training network will be required to take on the social responsibility of serving the rural societies, their operation could be financially unviable, at least in part. To mitigate this financial risk, the operation of the networks will be franchised to private entrepreneurs such as rural ISPs and ICT research institutes, which will run the networks as commercial and social operations. A financial resource pool will be created from the contributions of the service agencies in the SASEC regional network to provide needed financial support to the agencies in fulfilling their social responsibility. ADB will ensure that the operations of the village and research and training networks are effectively franchised, to maximize the benefits of public-private partnership.

63. The price for connecting to the CLSs in India is competitively determined in the market. However, no market price for interconnection has been determined as yet in Bangladesh. As a result, Bangladesh may set a price that is not at the optimum level for the operation of the SASEC regional network. ADB will collaborate closely with the EA and the telecommunications regulator to reduce such an operational risk in Bangladesh.

VI. ASSURANCES

64. In addition to the standard assurances, the four governments have given the following specific assurances, which will be incorporated in the legal documents:

- (i) **Signing of multilateral cooperation agreement.** The governments of the SASEC countries will sign the multilateral cooperation network agreement before the grant or loan for the Project takes effect.
- (ii) **Signing of bilateral interconnection agreement.** The governments of the SASEC countries will select the service agencies in their respective countries and sign the bilateral interconnection agreement with other SASEC countries before the contract for network design and installation is awarded.

- (iii) **Land acquisition and resettlement.** The governments will ensure that the network and equipment will be colocated with existing facilities whenever required. In the event of (a) any unanticipated or unforeseen involuntary resettlement, (b) private land acquisition, or (c) resettlement activities during project implementation, the governments of the SASEC countries will ensure that the Project is implemented in accordance with ADB's *Policy on Involuntary Resettlement* (1995) and all applicable laws and regulations in the SASEC countries.
- (iv) **Environmental protection.** The governments will ensure that any unexpected environmental impact will be addressed by consulting ADB. The construction of the data centers will take into account the recommendations from the initial environmental examination and will strictly follow the conditions attached in the building permit. Project implementation will take into consideration ADB's *Environment Policy* (2002), and the Government Protection Act, 1997.
- (v) **Labor laws.** The governments will ensure that all civil works, system development, and installation contractors (a) comply with all applicable labor laws; (b) do not employ child labor for construction and maintenance activities; (c) do not differentiate wages between men and women, particularly for work of equal value; (d) encourage the employment of the local poor who meet the job and efficiency requirements, particularly women; and (e) provide timely payment of wages at least monthly and safe working conditions to all workers. All civil works contracts will include specific clauses on these undertakings, and compliance will be strictly monitored by the PMU under the EA during project implementation.
- (vi) **Good governance and anticorruption.** Consistent with ADB's and the governments' commitment to good governance, accountability, and transparency, the governments will ensure that the project funds are used effectively and efficiently to implement the Project and to achieve the project objectives. The governments will (a) undertake the necessary measures to create and sustain a corruption-free environment; (b) ensure that the governments' anticorruption laws, if there are any, and ADB's *Anticorruption Policy*, are strictly enforced and are complied with during project implementation, and that relevant provisions of ADB's *Anticorruption Policy* are included in all bidding documents for the Project; (c) facilitate ADB's exercise of its right to investigate, directly or through its agents, any allegations of corrupt, fraudulent, collusive, or coercive practices relating to the Project; (d) conduct periodic inspections of the project contractors' activities related to fund withdrawals and settlements; and (e) ensure that all contracts financed by ADB in connection with the Project include provisions specifying the right of ADB to audit and examine the records and accounts of the EAs and all contractors, suppliers, consultants, and other service providers as they relate to the Project. The governments will cooperate with any audit and investigation and extend the necessary assistance, including access to all relevant books and records, as well as the engagement of independent auditors and experts that may be needed for the satisfactory completion of such audits and investigations.
- (vii) **Project performance monitoring system.** The governments will cause the PMUs to ensure the establishment of project performance monitoring systems acceptable to ADB within 3 months after grant or loan effectiveness.
- (viii) **Midterm review.** The governments and ADB will jointly undertake a midterm review of the Project on the third year of project implementation to assess progress and

identify any necessary changes in project design, the project implementation schedule, or implementation arrangements.

- (ix) **Counterpart support.** The governments will ensure that, throughout project implementation, adequate budgetary allocations for the required counterpart funds are made, approved, and released in a timely manner to ensure efficient and timely implementation of the Project.

VII. RECOMMENDATION

65. I am satisfied that the proposed grants and loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve

- (i) the grants of \$4,700,000 to the Kingdom of Bhutan and \$9,000,000 to Nepal; and the loan in various currencies equivalent to SDR 1,949,000 to the People's Republic of Bangladesh for the South Asia Subregional Economic Cooperation Information Highway Project, from ADB's Special Funds resources, with such terms and conditions as are substantially in accordance with those set forth in the draft Grant and Loan Agreements presented to the Board; and
- (ii) the provision of technical assistance not exceeding the equivalent of \$4,400,000 to the governments of the People's Republic of Bangladesh, Kingdom of Bhutan, India, and Nepal for the South Asia Subregional Economic Cooperation regional information and communication technology research and training network on a grant basis from the Regional Cooperation and Integration Fund for the Regional Cooperation and Integration Financing Partnership Facility.

Haruhiko Kuroda
President

27 November 2007

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
<p>Impact Enhanced regional flow, sharing, and integration of information, content, services, knowledge, and ideas in the SASEC subregion</p>	<p>20% improvement in the livelihood and well-being of rural communities in selected pilot districts in all SASEC countries, within 5 years after project completion</p> <p>10% yearly decrease in the cost and increase in the quality of data communication between the SASEC countries, for 5 years after project completion</p> <p>10% increase in the ICT composite index of e-readiness for all SASEC countries, within 5 years after project completion</p> <p>10% increase in ICT-enabled regional activities, such as regional e-trade, e-tourism, and e-training, within 5 years after project completion</p>	<p>Compilation of government statistics</p> <p>Baseline study and impact monitoring report</p> <p>ADB project completion report</p> <p>ADB evaluation missions</p> <p>Digital Opportunity Index published by the International Telecommunication Union (ITU) and other ICT indices published by United Nations organizations</p>	<p>Assumption Favorable political support and economic activities at the regional level among the SASEC countries</p>
<p>Outcome ICT made more accessible, affordable, inclusive, sustainable, and useful to remote and rural communities, entrepreneurs, and research and training institutes in all SASEC countries</p>	<p>Exchange of social capital^a between SASEC country villages through the SASEC regional network and village network, within 3 years after project completion</p> <p>10% increase in regional and country websites, e-business, and applications, within 3 years after project completion</p> <p>Establishment of the SASEC education and research collaborative network linking universities and rural communities in the SASEC countries, within 3 years after project completion</p> <p>10% increase in tele-density (both in terms of individual household and shared-facility tele-centers) and reduction in communication cost in remote and rural areas, within 2 years after project completion</p> <p>Financially and technically sustainable operation of the SASEC regional network, village network, research and training network by service agencies, universities,</p>	<p>ITU tele-density statistics</p> <p>Financial reports of service agencies</p> <p>ADB project completion report</p> <p>Report on the survey of project households, businesses, universities, and governments</p>	<p>Assumptions Proper implementation and enforcement of multilateral and bilateral agreements among the SASEC countries and in-country agreements</p> <p>Competitive, nondiscriminatory, and transparent operation of regional network by the SASEC service agencies for access to Internet service providers (ISPs) and other carriers within and outside the region</p> <p>Peering arrangements made among the ISPs of SASEC countries</p>

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
SASEC research and training network	<p>chatting, video conference, e-mail, community bulletin, etc., services</p> <p>In-country agreements for ownership transfer and operation signed by the EA and selected CEC operators in each country</p> <p>A university-based research and training center (RTC) established in each SASEC country</p> <p>Broadband connectivity established to link RTCs to the SASEC regional network</p> <p>A business linkage challenge fund established to encourage rural entrepreneur investments in ICT-enabled business development</p> <p>Online and off-line research and training programs in e-business development and IT professional development, provided through RTCs and CECs</p> <p>Awareness building and training to be provided to the communities and governments affected by the Project during project implementation</p>		
<p>Activities with Milestones</p> <p>Component 1: SASEC Regional Network</p> <ol style="list-style-type: none"> 1.1. Sign the multilateral regional cooperative network agreement, before the start of month 1. 1.2. Select a service agency from each SASEC country, by the end of month 3. 1.3. Sign six bilateral network agreements, by the end of month 6. 1.4. Develop the detailed network design, by the end of month 6. 1.5. Prepare bid documents, by the end of month 6. 1.6. Complete the tendering and selection of contractors, by the end of month 12. 1.7. Install, test, and operate the network, by the end of month 21. 1.8. Sign four in-country agreements for network transfer and operation, by the end of month 21. 1.9. Complete peering agreements, by the end of month 21. <p>Component 2: SASEC Village Network</p> <ol style="list-style-type: none"> 2.1. Select rural Internet service providers (ISPs) from all SASEC countries, by the end of month 3. 2.2. Develop the detailed network design, by the end of month 6. 2.3. Prepare bid documents, by the end of month 6. 2.4. Complete the tendering and selection of contractors, by the end of month 12. 2.5. Install, test, and operate the network and community e-centers, by the end of 			<p>Inputs</p> <p>ADB's grant of \$4.7 million to Bhutan and \$9.0 million to Nepal; ADB's loan of \$3.1 million to Bangladesh; ADB's TA grant of \$4.4 million under ADB's Regional Cooperation and Integration Fund (RCIF); financing of \$7.2 million by the SASEC governments</p>

Activities with Milestones	Inputs
<p>month 21.</p> <p>2.6. Sign the four in-country agreements for ownership transfer and operation, by the end of month 21.</p> <p>Component 3: SASEC Research and Training Network</p> <p>3.1. Select a university in each SASEC country to serve as country host for the research and training center (RTC), by the end of month 3.</p> <p>3.2. Develop the detailed design for RTCs and their connectivity to the SASEC regional network, by the end of month 6.</p> <p>3.3. Prepare bid documents, by the end of month 6.</p> <p>3.4. Complete the tendering and selection of contractors, by the end of month 12.</p> <p>3.5. Install, test, and operate RTCs and their networks, by the end of month 21.</p>	

ADB = Asian Development Bank, CEC = community e-center, EA = executing agency, ICT = information and communications technology, ITU = international telecommunication union, km = kilometer, RTC = research and training center, SASEC = South Asia Subregional Economic Cooperation, TA = technical assistance, VOIP = voice over internet protocol.

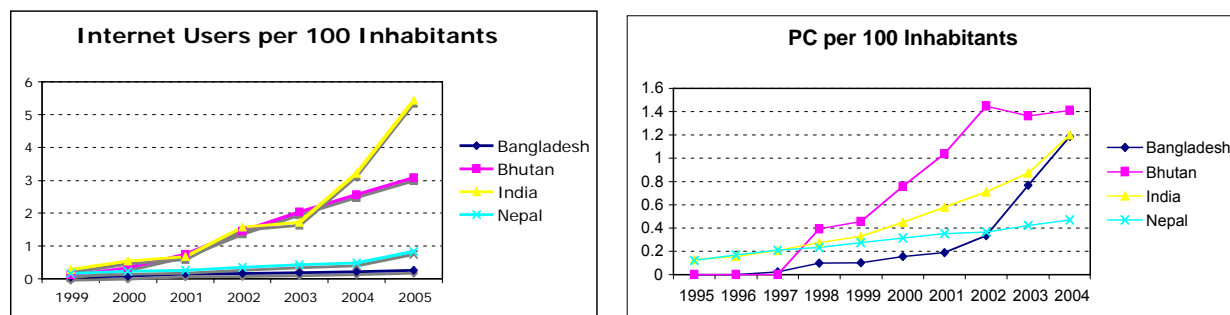
^a Social capital refers to the knowledge, norms, and networks that collectively define local communities. The concept recognizes that local networking and local information sourced from within rural communities are potentially powerful drivers for ICT use in the rural context.

SECTOR ANALYSIS

1. **ICT and the SASEC Subregion.** The Asian Development Bank (ADB) has been supporting regional cooperation among Bangladesh, Bhutan, India and Nepal through the South Asia Subregional Economic Cooperation (SASEC) Program since 2001.¹ Information and communication technology (ICT) was added as one of the priority sectors to the program in phase II and the first ICT Working Group (ICTWG) meeting was held in India in March 2004. All SASEC countries have acknowledged the significance of ICT in poverty alleviation and economic advancement in their ICT strategic plans. They have undertaken significant strategic policy development consistent with established planning process for ICT, especially in relation to infrastructure, e-government, e-education, e-commerce, training and skills development, and ICT industry development.

2. At present, the overall ICT performance of the SASEC countries is low, although the dynamics of ICT development in each country are different. This poor performance is partially caused by the limited nationwide connectivity despite the effects of rapid growth in privatization and competition in mobile telephony. In 2005, fixed tele-density ranged from 0.75 for Bangladesh to 4.55 for India; mobile tele-density, from 0.83 for Nepal to 8.17 for India; and Internet user penetration, from 0.26 for Bangladesh to 5.44 for India. PC penetration in 2004 ranged from 0.47 for Nepal to 1.41 for Bhutan. As shown in Figure A2.1, in recent years, there has been remarkable growth in Internet user penetration in India and Bhutan, and in PC penetration in most of the SASEC countries. Individual country statistics are summarized in Figure A2.1.

Figure A2.1: Growth in Internet User Penetration



3. Various international organizations have developed indices for measuring readiness to participate in the information society, using a series of standardized indicators representing the level of ICT connectivity, use, and uptake, as well as school enrolment and literacy. Among the major indices, the Digital Opportunity Index (DOI), published by the International Telecommunications Union (ITU),² was endorsed by the World Summit on the Information Society (WSIS) as part of the evaluation methodology and benchmarking system for statistical indicators in ICT. The index was designed to assess progress in creating digital opportunity and bridging the digital divide. There are four areas of evaluation: coverage and affordability of ICT services, access (including number of landlines, mobile phones, and computers per 100

¹ The Program has been supported through ADB. 2000. *Technical Assistance for Identification and Prioritization of Subregional Projects in South Asia*. Manila (TA 5936-REG); ADB. 2003. *Technical Assistance for South Asia Subregional Economic Cooperation II*. Manila (TA 6010-REG); and ADB. 2005. *Technical Assistance for South Asia Subregional Economic Cooperation III*. Manila (TA 6297-REG).

² International Telecommunications Union. 2007. *World Information Society Report*. Geneva.

persons), infrastructure (including Internet subscribers, mobile Internet subscribers, and international bandwidth), and quality (number of broadband and mobile broadband subscribers). Table A2.1 shows the DOI for the SASEC countries and other selected countries. As presented, all the SASEC countries rank very low, especially compared with the average for the Asia and Pacific region and the world average.

Table A2.1: Rank of Selected Countries on the Digital Opportunity Index of the International Telecommunications Union

Country	Opportunity Index	Infrastructure Index	Utilization Index	Composite Digital Opportunity Index	Rank (out of 181)
Korea, Rep. of	0.99	0.74	0.67	0.80	1
Singapore	1.00	0.71	0.45	0.72	5
Australia	0.98	0.64	0.32	0.65	22
Malaysia	0.98	0.34	0.18	0.50	57
China, People's Rep. of	0.92	0.28	0.16	0.45	77
Philippines	0.93	0.15	0.04	0.38	102
India	0.83	0.05	0.05	0.31	124
Bangladesh	0.73	0.02	0.01	0.25	134
Bhutan	0.61	0.04	0.01	0.22	140
Nepal	0.56	0.02	0.00	0.19	147
Cambodia	0.49	0.03	0.02	0.18	149
Asia and Pacific region average	0.82	0.26	0.14	0.40	92
World average	0.79	0.26	0.15	0.40	91

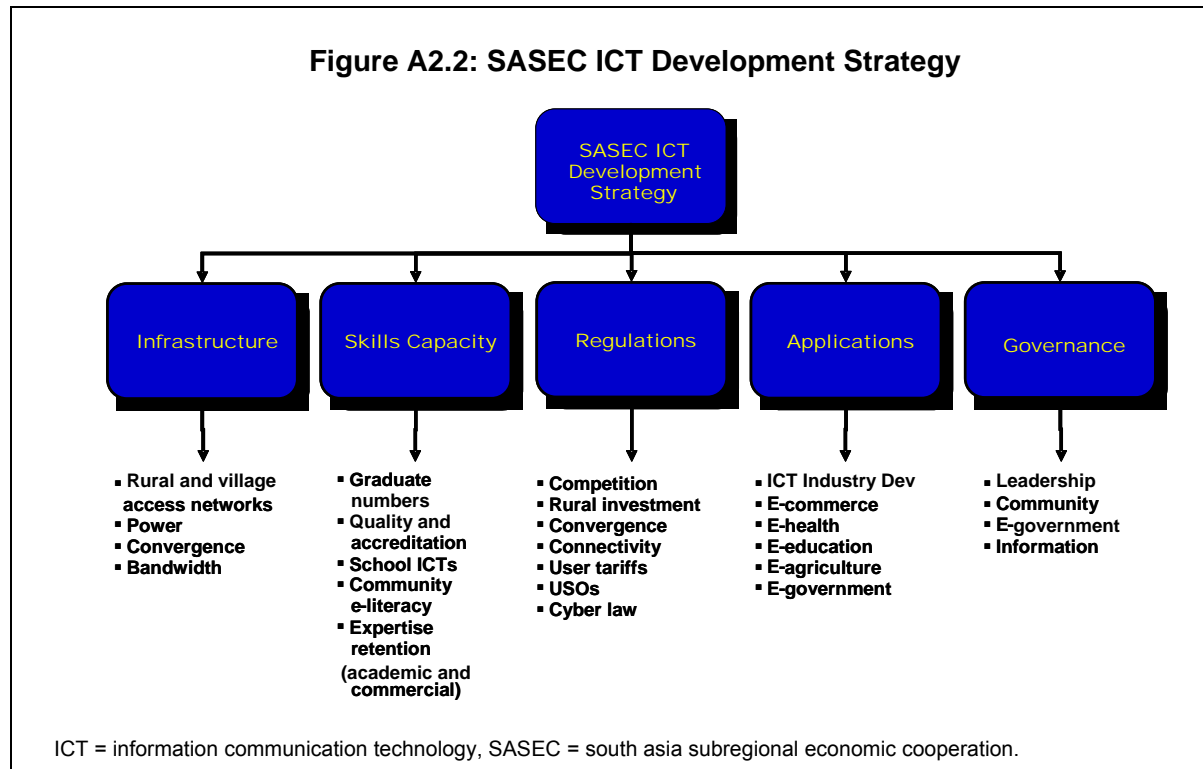
Source: Asian Development Bank estimates.

4. Despite the wide diversity among the SASEC countries and the relatively short implementation period, the ICTWG has made notable progress. With ADB assistance,³ it drafted a SASEC ICT development master plan laying down the strategy, framework, and priorities for SASEC regional cooperation in ICT to harness the full potential of ICT for poverty reduction and inclusive growth. The second SASEC ICTWG meeting in Bhutan held in February, 2006, accepted the master plan, which, among other things, identified three most urgent areas for improvement in ICT: fragmented cross-border connectivity, poor access to information in the rural areas, and insufficient human resource capacity. At the third ICTWG meeting in Dhaka in September 2006, the SASEC countries developed the concept of SASEC information highway to address such needs by delivering modern affordable and reliable broadband information, communication, and knowledge services within and across borders to universities, businesses, and rural and remote communities.

5. **SASEC ICT Strategy.** The SASEC regional ICT strategy in the master plan was formulated to coordinate and consolidate the national leadership, vision, and strategies of the individual countries. It identified the following common areas: (i) the central role of low-cost interconnected infrastructure; (ii) the priority need for ICT skills development; (iii) ICT industry development; (iv) e-applications development (e-community, e-commerce, e-government); and (v) regulation, legislation, and governance. It also identified the following common objectives:

³ ADB. 2005. *Technical Assistance for South Asia Subregional Economic Cooperation Information and Communication Technology Development Master Plan*. Manila (TA 6232-REG).

(i) the global positioning of the SASEC subregion in ICT; (ii) regional opportunities for ICT professionals and local ICT industry development; (iii) skills training, accreditation, and mutual recognition; (iv) affordable broadband capacity, reliability, and quality in the region; (v) investment, regional trade, and employment; (vi) cross-border community participation and benefits; and (vii) contribution to the achievement of the Millennium Development Goals (MDGs). Figure A2.2 is a schematic diagram of the SASEC ICT development strategy.



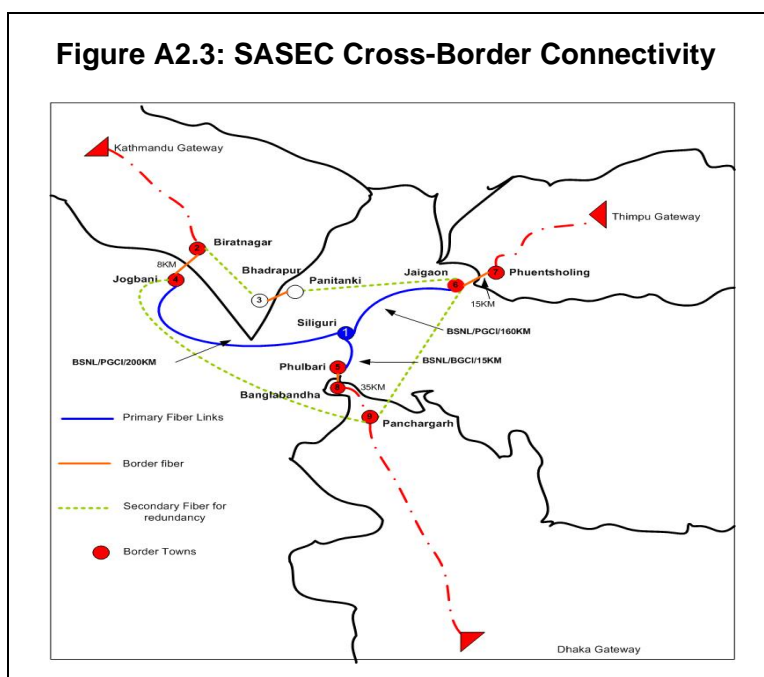
6. In all SASEC countries, there is considerable recognition of the benefits of broadband capacity and a growing awareness of the issues and opportunities emerging from convergence. The regulatory environment varies substantially among the SASEC countries but all the countries recognize the necessity of having independent regulatory authorities oversee the opening up of telecommunications infrastructure to competition. Also, the need to open up the infrastructure to investors, to achieve national objectives within a defined period, is explicitly acknowledged. Local ICT industry development is a common agenda. There are other considerations as well, including, for example, the structure and governance of the Internet and the global positioning of the region. There is also common recognition of skills development as a requirement at all levels, including community e-literacy and accredited graduate qualifications. Further, all SASEC members have identified extensive requirements for service applications, including government services such as e-education, e-health, and e-culture, as well as the potential for new governance structures to improve community participation. All members have also recognized the need for new institutions or for the enhancement of the capacity and course offerings of existing training institutions. These common interests and policies define a broad scope for priority areas of collaboration and regional ICT development strategy in the master plan. The results of the review of individual country policies are summarized in Table A2.3.

7. **SASEC Cross-Border Connectivity.** Despite the proximity of the SASEC countries to one another, the existing cross-border network in the subregion is fragmented and outdated. Reasonable broadband or even more basic ICT data applications cannot be supported in many communities, although voice communications, often of low quality, are available. All four SASEC countries are technically interconnected through fiber optics or microwave, but data communications among the countries are not direct and often go via third parties. Bhutan and Nepal are landlocked, with the Himalayas and the People's Republic of China to the north, and the border with India surrounding the rest of the territory. Both countries aspire to competitive access with redundancy to international networks, particularly to submarine cables. India and Bangladesh, on the other hand, have access to international fiber-optic cables via submarine cable landings, including the link to Sea-Me-We 4.⁴ Unlike Bhutan and Nepal, therefore, India and Bangladesh have high-capacity international bandwidth as well as alternative gateways and redundancy.

8. In the cross-border region, as shown in Figure A2.3 below, the fiber-optic links are carried by incumbent telecom operators and power companies: in Bangladesh, the Bangladesh Telegraph and Telephone Board (BTTB) and Power Grid Company of Bangladesh (PGCB); in Bhutan, Bhutan Telecom and Tala Hydro Power Authority; in India, Bharat Sanchar Nigam Limited (BSNL), Reliance Communications, RailTel, and Power Grid; and in Nepal, Nepal Telecom (NT) and Nepal Electrical Authority (NEA). However, the terrestrial cross-border links in the region either lack capacity or redundancy, or are sometimes missing.

- (i) In India, BSNL and Reliance have international long-distance licenses to allow cross-border access. BSNL is the incumbent carrier and has most of the required links to the SASEC neighbors.
- (ii) Bangladesh-India border link: No fiber-optic cable is available from the northern town of Panchagarh in Bangladesh to the border point of Banglabandha, Bangladesh, and its links to the nearest Indian location of Fulbari. From Dhaka to Panchagarh, BTTB has a minimum of 12 core fiber, and PGCB, 16 core fiber.
- (iii) Bhutan-India border link: There is a cross-border fiber-optic cable, 12 core-fiber synchronous transport module 1 (STM 1) (155 megabytes [MB]), carried by BSNL and Bhutan Telecom (with 4 MB of Internet access capacity), connecting Phuentsholing in Bhutan to Jaigaon in India. Bhutan Telecom has a fiber-optic link from Thimpu to Phuentsholing via Bhutan Power Corporation's transmission network grid.
- (iv) Nepal-India border link: There is a cross-border fiber-optic cable, 12 core-fiber STM 1 (155 MB), carried by BSNL and Nepal Telecom (with 16 MB of Internet access capacity), connecting Biratnagar in Nepal to Jogbani in India. Reliance also has a fiber-optic cable connecting Biratnagar and Jogbani. Within Nepal, the NEA has a fiber-optic link between Kathmandu and Hetauda, and Nepal Telecom has fiber-optic capacity between Hetauda and Biratnagar.

⁴ The submarine telecommunications cable linking Southeast Asia to Europe via the Indian subcontinent and the Middle East.



9. Even though fiber-optic links have been established, they cannot be used for data traffic without Internet exchange points and a peering arrangement.⁵ The largest domestic market in India is Mumbai, which is a fair distance from the other three countries. The nearest domestic market is in Calcutta, which has yet to be fully developed to attract Internet service providers (ISPs) from the neighboring countries. As a result, there has been massive deployment of expensive satellite connections for Internet access in the last decade in the landlocked countries of Bhutan and Nepal. Before the establishment of local exchange points, even traffic within the countries was exchanged overseas, generally in Hong Kong, China but sometimes also in the United States.⁶ There is a vast difference in cost between Internet traffic routed internationally and locally routed traffic. The fragmentation in the regional network has led to heavy overhead transit costs and ultimately high user cost, and limited the full use and uptake of ICT-enabled services in the subregion.

10. **Internet.** Internet access in the South Asia region was first introduced in the early 1990s by ERNET in India. ERNET also extended dial-up e-mail service to its partner in Nepal soon afterward. But the real impetus came with the commercial launching of Internet services throughout the region. Commercial Internet service was launched in India in 1995, by the state-owned VSNL. Other countries in the region were quick to follow, with Bhutan being the only exception until 2000. While the state-owned VSNL and Bhutan Telecom took the lead in India and Bhutan, respectively, private players took the lead in Bangladesh and Nepal. Except for one single ISP in Nepal connecting through VSNL in those early days, there was no regional Internet connectivity. Until recently, even providers within countries were not connected to each other. Except for India, the primary mode of connection to the upstream providers is still through

⁵ Peering is the arrangement of traffic exchange between Internet service providers (ISPs). Larger ISPs with their own backbone networks agree to allow traffic from other large ISPs in exchange for traffic on their backbones. They also exchange traffic with smaller ISPs to reach regional end points.

⁶ The global exchange points and bandwidth markets are located on the East Coast of the United States (New York and Washington, DC), the West Coast of the United States (San Francisco Bay Area and Los Angeles), Europe (London and Amsterdam), and Asia (Hong Kong, China and Singapore).

satellite connections, given the lack of subsea cable landing in the other countries. Recent investments in infrastructure inside India, coupled with the liberalization of the telecom sector, can have a positive effect in providing faster connectivity to the other countries in the region.

11. **Rural ICT Program.** Other than in India, there is as yet little prospect and practicality for the use of ICT for poverty reduction and rural development in the SASEC countries. Rural community e-centers (CECs) have been continuing for some years in Bangladesh and Nepal, and more recently in Bhutan. However, these experiments have not yet reached national scale. In India, the CEC movement is now a national initiative, with the prospect of connectivity in every village within the next few years. Several hundreds of CECs operate in Bangladesh and Nepal, mostly driven by NGOs and private sector, and tens of CECs operate in Bhutan, mainly driven by the government and development agencies. In India, CECs exist in the tens of thousands, driven by a mix of large enterprises, entrepreneurs, universities, government, and NGOs. However, owing to the huge size of the poor population, there are tremendous problems of scale in India. Such problems are less severe in the other SASEC countries.

Table A2.2: Economic and ICT Statistics on the SASEC Countries

Category	Bangladesh		Bhutan		India		Nepal		Low-Income Group	South Asia Region
	2000	2005	2000	2005	2000	2005	2000	2005	2005	2005
Economic and Social Context										
Population, total (million)	129.0	142.0	0.6	0.64	1,016.0	1,095.0	24.0	27.0	2,352.0	1,470.0
Urban population (% of total population)	23.0	25.0	10.0	11.00	28.0	29.0	13.0	16.0	30.0	28.0
Poverty (% of population below \$1 per day)	41.3	—	—	—	—	34.3	34.4	24.1	—	30.8
GNI per capita, Atlas method (current \$)	390.0	470.0	720.0	1,250.00	450.0	730.0	220.0	270.0	585.0	692.0
GDP growth, 1995–2000 and 2000–2005 (%)	5.2	5.4	6.1	7.50	5.8	7.0	4.6	2.8	6.1	6.5
Adult literacy rate (% ages 15 and over)	—	—	—	60.00	—	61.0	—	49.0	61.0	58.0
Primary, secondary, tertiary school enrollment (% gross)	58.0	52.0	—	—	55.0	62.0	56.0	58.0	56.0	58.0
ICT Sector Structure										
Separate telecommunications regulator	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Status of main fixed-line operator	Public	Public	Public	Public	Public	Public	Public	Public		
Level of competition: international long distance	M	M	M	M	M	C	M	P		
Level of competition: mobile	C	C	—	M	P	C	M	P		
Level of competition: Internet service provider	—	C	—	P	C	C	C	C		
Government prioritization of ICT (scale of 1–7)	—	4.4	—	—	—	5.6	—	—	—	4.9
ICT Sector Performance										
Access										
Telephone main lines (per 1,000 people)	4.0	8.0	23.0	51.00	32.0	45.0	11.0	17.0	37.0	39.0
International voice traffic (minutes per person) ^a	2.0	5.0	—	41.00	2.0	3.0	2.0	6.0	5.0	4.0
Mobile subscribers (per 1,000 people)	2.0	63.0	0.0	59.00	4.0	82.0	0.0	9.0	77.0	79.0
Population covered by mobile telephony (%)	40.0	80.0	—	—	—	—	—	—	—	—
Internet users (per 1,000 people)	1.0	3.0	4.0	39.00	5.0	55.0	2.0	4.0	44.0	49.0
Personal computers (per 1,000 people)	2.0	12.0	8.0	20.00	5.0	16.0	3.0	4.0	11.0	16.0
Households with television (%)	18.0	23.0	—	58.00	30.0	32.0	3.0	—	15.0	32.0

Category	Bangladesh		Bhutan		India		Nepal		Low-income Group	South Asia Region
	2000	2005	2000	2005	2000	2005	2000	2005	2005	2005
Quality										
Telephone faults (per 100 main lines per year)	—	—	—	54.0	165.5	126.0	100.2	68.0	—	88.1
Broadband subscribers (per 1,000 people)	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.9	1.0
International Internet bandwidth (bits per person)	0	0	2	16	1	18	0	2	15	18
Affordability										
Price basket for fixed line (\$ per month, residential)	10.7	6.9	4.9	5.1	6.0	3.3	2.6	3.1	8.7	5.1
Price basket for mobile (\$ per month, 2006)	—	2.5	—	3.9	—	2.4	—	2.0	9.6	2.4
Price basket for Internet (\$ per month)	—	24.0	—	14.9	—	6.8	—	8.1	30.1	8.1
Price of call to United States (\$ per 3 minutes)	4.14	2.02	1.19	0.66	3.36	1.19	5.28	2.04	1.99	2.02
Institutional Efficiency and Sustainability										
Total telecommunications revenue (% of GDP)	0.8	1.5	1.2	2.0	1.5	1.9	1.3	1.2	0.7	2.0
Total telephone subscribers per employee	48	—	41	74	85	—	60	110	141	125
Total telecommunications investment (% of revenue)	25.1	15.4	26.2	44.5	49.3	—	26.7	26.7	30.9	15.4
ICT Applications										
ICT expenditure (% of GDP)	2.0	2.4	—	—	3.6	5.8	—	—	5.9	5.7
E-government readiness index (scale of 0–1)	—	0.18	—	0.29	—	0.40	—	0.30	0.24	0.29
Secure Internet servers (per 1 million people, 2006)	0.0	0.0	—	—	0.1	0.7	—	0.6	0.5	0.6
Schools connected to the internet (%)	—	—	—	—	—	—	—	—	—	—

— = data not available, C = competition, GDP = gross domestic product, GNI = gross national income, ICT = information and communication technology, M = monopoly, MDG = Millennium Development Goal, P = partial competition, PC = personal computers.

^a Outgoing and incoming.

Note: Figures in italics are for years other than those specified.

Sources: Economic and social context: UNDP and World Bank; ICT sector structure: ITU, WEF; ICT sector performance: Global Insight/WITSA, ITU, Netcraft, UNDESA, UNPAN, and World Bank. Produced by the Global Information and Communication Technologies Department and the Development Economics Data Group.

Table A2.3: Overview of the ICT Sector in the SASEC Countries

Item	Bangladesh	Bhutan	India	Nepal
ICT-Using Sectors	<ul style="list-style-type: none"> ▪ In 2002 there were 450,000 desktop PCs in Bangladesh, with sales dominated by locally assembled clones. ▪ Automatic System for Customs Data (ASYCUDA) participation 	<ul style="list-style-type: none"> ▪ Computers were first introduced in Bhutan in 1984. There are about 4,000 computers in the country. ▪ There are 18 computer-training institutes, including the Royal Institute of Management, a government Institute. 	<ul style="list-style-type: none"> ▪ The National Informatics Center has launched websites for various arms of the Government, including the Parliament and the ministries of finance, industry, and education, as well as state governments. ▪ Simple, Moral, Accountable, Responsive and Transparent (SMART) governance ▪ Electronic data interchange (EDI) for e-commerce 	<ul style="list-style-type: none"> ▪ There were about 80,000 PCs in 2001. ▪ ASYCUDA participation
ICT-Producing Sectors (except telecom)	<ul style="list-style-type: none"> ▪ The computer hardware peripherals and software market in Bangladesh is worth about \$25 million and is expected to grow by 20–25% yearly. ▪ About 100 local companies are involved in the development and export of software. ▪ In 2003, export earnings from software exports were expected to be \$30 million. ▪ Many computer assemblers imported motherboards and other components from Taipei, China and the Republic of Korea, while the software and peripherals market was largely dominated by US brands. 	<ul style="list-style-type: none"> ▪ 16 IT firms in the country, including suppliers, and service and maintenance centers. ▪ Most IT companies are in the SME category. 	<ul style="list-style-type: none"> ▪ The Indian software and services industry has emerged as one of the fastest-growing sectors in the Indian economy, with a turnover of \$12.7 billion and exports of \$10 billion and over 600,000 employees. ▪ The hardware segment contributed to about \$7 billion in revenues (2001–2002) with exports contributing a meager \$1.3 billion. 	<ul style="list-style-type: none"> ▪ Unofficial data (no authentic figures for software exports from Nepal) suggest that exports in ICT amount to about NRs150 million per year. ▪ According to its IT Policy, Nepal plans to increase exports related to IT to NRs10 billion by 2011. ▪ Computer hardware is imported from Hong Kong, China and Singapore at a cost of around \$20 million.
Telecommunications	<ul style="list-style-type: none"> ▪ Bangladesh Telegraph & Telephone Board (BTTB), a government entity, is the national telecom operator. ▪ The telecommunication sector is open to private sector participation. Cellular telephony, rural telephony, and other value-added services, including Internet 	<ul style="list-style-type: none"> ▪ Bhutan has established a digital telecommunication system. ▪ The Royal Institute of Management in Bhutan was connected to the information superhighway through a leased line with a speed of 64 KB on 	<ul style="list-style-type: none"> ▪ The Telecom Regulatory Authority of India (TRAI) was created to regulate the telecom industry. ▪ Three national and several regional Internet service providers have begun 	<ul style="list-style-type: none"> ▪ The Nepal Telecommunications Corporation (NTC) is the sole provider of basic telecommunication services including fax and data services.

Item	Bangladesh	Bhutan	India	Nepal
	<p>services are being provided by private sector operators.</p> <ul style="list-style-type: none"> Independent Telecommunications Regulatory Commission is being set up. 	<p>7 December 1999.</p>	<p>operations.</p> <ul style="list-style-type: none"> Close to 20 players in the Indian ISP market try to create independent international Internet gateways. 	<ul style="list-style-type: none"> Nepal is linked to India via terrestrial and satellite networks. The terrestrial link to India was upgraded to a digital system with the installation of fiber-optic fiber cables.
National ICT Dev't Plans/Programs	<ul style="list-style-type: none"> The National Information Technology (NIT) Policy was finalized in 2002. The Law of IT was finalized by the Government. Other government support: ICT has been declared a priority sector; all taxes and duties on imports of computer hardware and software have been waived; and a submarine cable link has been set up to link the country to the global highway. Human resource development: <ul style="list-style-type: none"> Increase computer literacy through education; incorporate computer education at secondary level and in 2-year courses; increase computer science graduates. Establish training centers: foreign franchises, local training institutes (government and private), and in-house training. 	<ul style="list-style-type: none"> The national ICT master plan, published in 2001 by the Division of Information Technology (DIT), identifies projects and initiatives for ICT development in Bhutan. A draft comprehensive act covers digital signatures, data privacy, security, convergence, and cyber crime, 	<ul style="list-style-type: none"> Five-Year Economic Plan for 1995–2000: support for the buildup of ICT resources, both infrastructure and human resources. Electronic Commerce Act of 1998; Semiconductor IC Design Bill of 1999; Information Technology Act of 2000; IT Policy of the government of Andhra Pradesh, Hyderabad, India (Government Order Nos. 506 [Revenue]; 67 [Energy]; 161 [Environment]; 58 [Finance and Planning for ICT]). 	<ul style="list-style-type: none"> 9th Five-Year Plan (1997–2002) stresses the highly contributory role of ICT in Nepal's economic development. Telecommunication Policy is being reviewed for upgrading. IT policy, 2000; draft of proposed cyber law; and proposed spectrum policy.

ASYCUDA = automatic system for customs data, BTTB = Bangladesh Telegraph and Telephone Board, = DIT = Division of Information Technology, EDI = electronic data interchange, ICT = information communications technology, NIT = national information technology policy, NTC = Nepal Telecommunications Corporation, SMART = simple, moral, accountable, responsive and transparent, TRAI = Telecom Regulatory Authority of India.

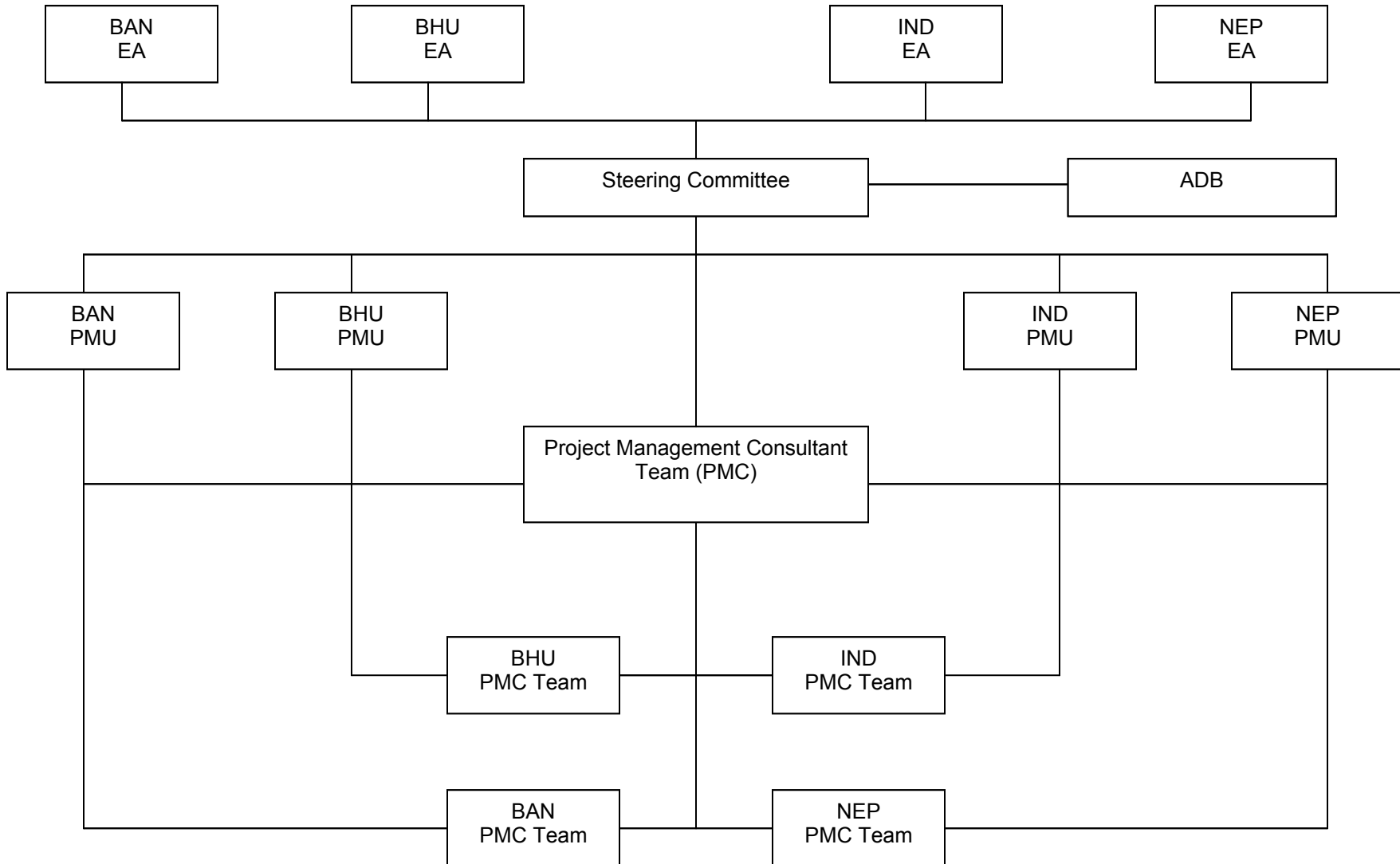
Source: Asian Development Bank estimates.

COST ESTIMATES AND FINANCING PLAN

Item	Cost	ADB		Bangladesh		Bhutan		India		Nepal	
		\$ '000	% of Cost Category	\$ '000	% of Cost Category	\$ '000	% of Cost Category	\$ '000	% of Cost Category	\$ '000	% of Cost Category
A. Base Cost											
1. SASEC Regional Network	16,540	12,970	78	590	4	510	3	1,320	8	1,150	7
2. SASEC Village Network	2,750	1,840	67	80	3	100	4	630	23	100	4
3. Project Management Consultant	2,100	1,530	73	40	2	40	2	450	21	40	2
4. Administrative Support	320	240	75	0	0	0	0	80	25	0	0
Subtotal (A)	21,710	16,580	76	710	3	650	3	2,480	11	1,290	6
B. Contingencies											
1. Physical	2,140	100	5	370	17	500	23	240	11	930	43
2. Price	110	80	73	20	18	0	0	10	9	0	0
Subtotal (B)	2,250	180	8	390	17	500	22	250	11	930	41
C. Interest During Construction											
	40	40	0	0	0	0	0	0	0	0	0
Total	24,000	16,800	70	1,100	5	1,150	5	2,730	11	2,220	9

ADB = Asian Development Bank, SASEC = South Asia Subregional Economic Cooperation.
Source: Asian Development Bank estimates.

IMPLEMENTATION ARRANGEMENTS



ADB = Asian Development Bank, BAN = Bangladesh, BHU = Bhutan, EA = executing agency, IND = India, NEP = Nepal, PMC = project management consultant, PMU = project management unit.

IMPLEMENTATION SCHEDULE

Milestone	2007			2008												2009												
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
A. Agreements																												
1. Multilateral																												
2. Service Agency																												
3. Bilateral Interconnection																												
4. Peering																												
B. Project Implementation																												
1. Project Management Consultant Recruitment																												
2. Selection of Service Agency																												
3. Network Design																												
4. Preparation of Bid Document																												
5. Tendering and Selection of Contractors																												
6. Installation, Testing, and Acceptance of Networks																												

Source: Asian Development Bank estimates.

PROCUREMENT PLAN

Project Name: SASEC Information Highway Project

Grant and Loan Amount: \$16.8 million

Grant Number:

Executing Agencies: Ministry of Science and Information and Communication Technology of Bangladesh, Ministry of Information and Communication of Bhutan, Department of Information Technology of the Ministry of Communications and Information Technology of India, and Ministry of Information and Communication of Nepal

A. Project Procurement Thresholds

1. Except as otherwise agreed to by the Asian Development Bank (ADB), the following process thresholds shall apply to the procurement of goods and works.

Procurement of Goods and Works	
Method	Threshold
International competitive bidding for works	> \$1,000,000
International competitive bidding for goods	> \$500,000
National competitive bidding for works	≤ \$1,000,000 and > \$100,000
National competitive bidding for goods	≤ \$500,000 and > \$100,000
Shopping for works	≤ \$100,000
Shopping for goods	≤ \$100,000
Direct contracting	≤ \$10,000

B. ADB Prior or Post Review

2. Except as ADB may otherwise agree to, the following prior- or post-review requirements apply to the various procurement and consultant recruitment methods used for the Project.

Procurement of Goods and Works		
Procurement Method	Prior or Post	Comments
International competitive bidding for works	Prior	Use subject to ADB's <i>Procurement Guidelines</i> (2007, as amended from time to time), Chapter III, and Project Administration Instructions (PAI) 3.03
International competitive bidding for goods	Prior	Use subject to ADB's <i>Procurement Guidelines</i> , Chapter III, and PAI 3.03
National competitive bidding for works	Prior	Use subject to the provisions of the NCB Annex, ^a ADB's <i>Procurement Guidelines</i> , para. 3.3/3.4, and PAI 3.04.
National competitive bidding for goods	Prior	
Shopping for works	Post	Use subject to ADB's <i>Procurement Guidelines</i> , para. 3.5, and PAI 3.04 C
Shopping for goods	Post	
Limited international bidding	Prior	Use subject to ADB's <i>Procurement Guidelines</i> , Section 3.2, and PAI 3.03
Direct contracting	Post	ADB needs to be satisfied that the prices to be paid are reasonable, and the method applied is in accordance with ADB's <i>Procurement Guidelines</i> , para. 3.6, and PAI 3.05 A

Recruitment of Consulting Firms		
Recruitment Method	Prior or Post	Thresholds / Comments
Quality- and cost-based selection (80:20) of firm by ADB	Prior	Threshold: >\$200,000 Executing Agency (EA) selects, negotiates, and manages the contract. Three EA submissions (to ADB) are required, namely: (i) draft RFP and shortlist, (ii) technical evaluation report, (iii) overall ranking report, and (iv) draft negotiated contract. See Consulting Guidelines, Chapter II, A.1.a., and PAI 2.02, Part E, B. Type of proposal dependent on budget
Consultants qualification selection	Prior	Threshold: ≤ \$200,000 Included as a possible option. EA selects, negotiates, and manages the contract.
Least-cost selection (LCS)	Prior	Threshold: ≤ \$100,000 Included as a possible option. EA selects, negotiates, and manages the contract.

^a NCB annex to loan agreement.

C. Goods and Works Contracts (in excess of \$1,000,000)

General Description	Value (\$'000)	Procurement Method	Prequalification of Bidders (Yes/No)	Advertisement Date	Comments
A. System Development, Supply, and Installation contract through ADB financing. SASEC regional network and village network for Bangladesh	3,150	ICB	Yes	October 2008	Single bid – following ADB's <i>Procurement Guidelines</i>
SASEC regional network and village network for Bhutan	4,670	ICB	Yes	October 2008	Single bid – following ADB's <i>Procurement Guidelines</i>
SASEC regional network and village network for Nepal	9,530	ICB	Yes	October 2008	Single bid – following ADB's <i>Procurement Guidelines</i>
SASEC research and training network for Bangladesh, Bhutan, India, and Nepal	2,040	ICB	Yes	October 2008	Single Bid – Following ADB's <i>Procurement Guidelines</i>

ICB = international competitive bidding.

D. Consulting Services Contracts (in excess of \$100,000)

General Description	Contract Value (\$'000)	Recruitment Method	Advertisement Date	International or National Assignment	Comments
Project management consultant	828	QCBS (80:20), STP	November 2007	International	ADB selects and negotiates. EAs contract.
Project management consultant for Bangladesh	303	QCBS (80:20), STP	November 2007	National	EA selects, negotiates, and contracts
Project management consultant for Bhutan	303	QCBS (80:20), STP	November 2007	National	EA selects, negotiates, and contracts
Project management consultant for India	200	QCBS (80:20), STP	November 2007	National	EA selects, negotiates and contracts
Project management consultant for Nepal	303	QCBS (80:20), STP	November 2007	National	EA selects, negotiates, and contracts

ADB = Asian Development Bank, EA = executing agency, QCBS = quality- and cost-based selection.

OUTLINE TERMS OF REFERENCE FOR PROJECT MANAGEMENT CONSULTING SERVICES

A. Overview

1. The project management consultant team will consist of (i) an international team comprising a team leader, a design engineer, and a procurement specialist; and (ii) four country teams. Each country team will have three subteams: a South Asia Regional Economic Cooperation (SASEC) regional network team and a village network/research and training network team, each subteam comprising a team leader, a design engineer, a procurement specialist, and a network engineer; and a joint team consisting of a social development specialist, an environment specialist, and a quality assurance specialist. A firm of international consultants will be hired for 36 person-months, and a firm of national consultants, for 100 person-months in Bangladesh, Bhutan, and Nepal, and for 57 person-months in India.

2. The two national project management subteams—the SASEC regional network team and the village network/research and training network team—will discharge their responsibilities with the guidance and instruction of the international team leader and submit their monthly activity report to the international team leader. The joint team members—the social development specialist, the environment specialist, and the quality assurance specialist—will implement their tasks with the guidance and instruction of the international team leader and in coordination with the national subteams concerned, and submit their monthly activity report to the international team leader. The composition of the international team and the national team is summarized in Table A7.1.

Table A7.1: Composition of Consultant Team

Item	Person-Month							Total
	Team Leader	Design Engineer	Procurement Specialist	Network Engineer	Social Development Specialist	Environment Specialist	Quality Assurance Specialist	
International Teams	21	12	3					36
BAN, BHU, and NEP Country Team								
Regional Network Team	21	5	3	12				41
Village Network/Research and Training Network Team	21	5	6	16				48
Joint Team					4	4	3	11
Total	42	10	9	28	4	4	3	100
India Team								
Regional Network Team								
Village Network/Research and Training Network Team	6	2		4				12
Joint Team					2	2	3	7
Total	27	7		16	2	2	3	57

Source: Asian Development Bank estimates.

B. Scope of Work

1. International Consultant Team

3. **Team Leader.** The team leader will be responsible for the management and coordination of all of the project elements, namely, the SASEC regional network, the SASEC village network, and the SASEC research and training network, as part of the attached technical assistance (TA). This consultant's responsibilities will be as follows:

- (i) Manage and coordinate all activities associated with the implementation of the SASEC Information Communication Technology initiatives throughout Bangladesh, Bhutan, India, and Nepal as outlined in the scope of work for each project element, with the support of the national project management team in each country.
- (ii) Prepare a detailed project plan for each project element to ensure that all tasks and resources are allocated and sufficient to complete the Project within the allocated time frame and budget, and manage the Project on the basis of this plan, reporting any significant change that may affect the Project's term and budget.
- (iii) Act as project leader of the consultant team including the national consultant teams in the SASEC countries, supervise all national project management teams and monitor their activities, and coordinate with the Asian Development Bank (ADB) and the Executing Agencies (EAs) in the SASEC countries.
- (iv) Coordinate with other consulting team members to achieve the objectives of the scope of work and comply with all reporting requirements.
- (v) Prepare all procedures regarding procurement in accordance with ADB's *Procurement Guidelines* (2007, as amended from time to time).
- (vi) Oversee all tendering processes with each project management unit (PMU) and be a member of the evaluation team.
- (vii) Establish project procedures for the audit of all procurement activities in compliance with the policy procedures outlined by the selected auditing firm.
- (viii) Coordinate with all PMUs under the EAs to ensure cooperative management of the Project.
- (ix) Establish a monthly reporting regime for all team members as well as project rolling forecast procedures for cash-flow management and implementation risk mitigation.
- (x) Ensure that all project payments are made in accordance with ADB's guidelines and procedures, and report all discrepancies.
- (xi) Assist all EAs and PMUs in maintaining open communications at all times.
- (xii) Create a project document register procedure for use by all team members.
- (xiii) Coordinate the standard bilateral network agreement to be signed by the service agencies nominated by the EAs, as well as the agreement of transfer of title and operation between the EA and the selected service agency.
- (xiv) Ensure that all consulting team members are fully aware of the requirements and guidelines established to implement the project elements.

4. **Design Engineer.** The design engineer will be responsible for the overall technical design, specifications, equipment selection, and networking compliance of all of the project elements, namely, the SASEC regional network, the SASEC village network, and the SASEC

research and training network, as part of the attached TA. The responsibilities of the design engineer will be as follows:

- (i) Manage and coordinate all design activities with each in-country counterpart.
- (ii) Document the technical specifications of the networks and reach consensus on these with the member countries.
- (iii) Supervise in-country counterparts in preparing design specifications for wireless connectivity to community e-centers (CEC) hubs and remotes, and connectivity from the SASEC regional network to the selected research and training institutes.
- (iv) Document the design specifications for the procurement of wireless equipment in conjunction with service agencies.
- (v) Prepare all technical specifications for procurement.
- (vi) Oversee all implementation works to ensure compliance with specifications.
- (vii) Ensure all monthly reporting is complied with and submitted on time to the team leader.
- (viii) Assist the team leader with overall project planning.
- (ix) Coordinate with the PMUs in all SASEC countries and all selected service agencies to ensure cooperative management of the Project.
- (x) Assist the PMUs in all SASEC countries and all service agencies in maintaining open communications at all times.
- (xi) Develop a site survey and coverage plan for use throughout the Project by all team members.
- (xii) Prepare testing and acceptance criteria in conjunction with in-country quality assurance managers.
- (xiii) Maintain a comprehensive document register for handover procedures.
- (xiv) Oversee all tendering processes with the PMU and be a member of the evaluation team.
- (xv) Ensure that all consulting design team members are fully aware of the requirements and guidelines established to implement the project elements.

5. **Procurement Specialist.** The procurement specialist will be responsible for all procurement and evaluation processes for all of the project elements, namely, the SASEC regional network, the SASEC village network, and the SASEC research and training network, as part of the attached TA. The responsibilities of the procurement specialist will be as follows:

- (i) Prepare all procurement documentation in consultation with the PMUs and service agencies in all SASEC countries in accordance with each country's rules and regulations as well as ADB's *Procurement Guidelines*.
- (ii) Prepare the criteria for prequalification in consultation with national procurement specialists and the PMUs.
- (iii) Prepare bid documents for (a) the contract package in each country, combining the SASEC regional network and the SASEC village network into a single contract package; and (b) the contract package for the research and training network, combining the four SASEC countries into a single contract package in conformity with ADB's *Procurement Guidelines*.
- (iv) Prepare evaluation criteria for the technical proposals for each contract package in conformity with ADB's *Procurement Guidelines*.
- (v) Hold joint meetings with the implementing agencies in each country and the PMU to review the draft bid documents, including the prequalification criteria and technical proposal evaluation criteria, and finalize the bid documents.

- (vi) Supervise and monitor the procurement activities of the national procurement specialists in each country.
- (vii) Assist the PMUs in implementing the tendering procedures, particularly for prequalification and evaluation of technical proposals.
- (viii) Establish a logistic program for the delivery of equipment, as well as quality procedures for its timely arrival on the site.

2. National Consultant Team

6. The national team will have three subteams: a SASEC regional network team and a village network/research and training network team, each subteam comprising a team leader, a design engineer, a procurement specialist, and a network engineer; and a joint team that consists of a social development specialist, an environment specialist, and a quality assurance specialist.

7. **Team Leader.** The team leader will be tasked to

- (i) Manage and coordinate all activities associated with the implementation of the SASEC ICT initiatives throughout the country, as outlined in the scope of work for each project element.
- (ii) Assist the international team leader in preparing a detailed project plan for each in-country project element, to ensure that all tasks and resources are allocated and sufficient to complete the Project within the allocated time frame and budget, manage the Project on the basis of this plan and report any significant change that may affect the Project's term and budget to the international team leader, and submit a monthly progress report to the international team leader.
- (iii) Act as team leader of the in-country consultant team, supervise and monitor the activities of team members, and coordinate with the PMU, the service agencies, and the international consultant team.
- (iv) Coordinate with other consulting team members to achieve the objectives of the scope of work and comply with all reporting requirements.
- (v) Assist the PMU in coordinating with the international consultant team in the tendering process and be a member of the evaluation team.
- (vi) Coordinate with the PMU and the service agencies to ensure cooperative management of the Project.
- (vii) Comply with all reporting requirements to ensure the timely submission of reports to the international team leader.
- (viii) Establish a comprehensive reporting regime, compliant with that required by the international team leader, for the use of all team members.
- (ix) Reconcile all project payments against procurement documentation before submitting the documentation to the PMU for approval, and report all irregularities and discrepancies.
- (x) Compile a comprehensive document register for handover procedures.
- (xi) Follow up all corrective measures recommended by the quality assurance manager.
- (xii) Assist the PMU and the service agencies in maintaining open communications at all times.
- (xiii) Ensure that all consulting team members are fully aware of the requirements and guidelines established to implement the project elements.

8. **Design Engineer.** Each network subteam will be assigned a design engineer, who will be responsible for the technical design, specifications, equipment selection, and networking compliance of each of the project elements in the country for the SASEC regional network, village network, and research and training network. The responsibilities of the design engineer will be as follows:

- (i) Manage and coordinate all design activities under the direction of the international project design engineer.
- (ii) Document the technical specifications for the in-country network in consultation with the PMU and the service agency in accordance with the scope of work.
- (iii) Design the specifications for wireless connectivity to CEC hubs and remotes and the connectivity from the SASEC regional network to the research and training institute under the direction of the international project design engineer.
- (iv) Document the design specifications for the procurement of wireless equipment in conjunction with the service agencies.
- (v) Prepare all technical specifications for the procurement process under the direction of the international project design engineer and procurement specialist.
- (vi) Oversee all implementation works to ensure compliance with specifications.
- (vii) Submit a monthly activity report to the team leader.
- (viii) Ensure that all sites are surveyed in accordance with the plans developed by the international project design engineer.
- (ix) Ensure that all sites are analyzed and documented correctly, particularly with regard to path profiles and coverage plots.
- (x) Assist the team leader with project planning.
- (xi) Design site layouts and fit-outs and obtain all the necessary regulatory building and construction approvals before the start of actual work.
- (xii) Coordinate with the PMU and the service agency to ensure cooperative management of the Project.
- (xiii) Assist the PMU and the service agency in maintaining open communications at all times.
- (xiv) Assist the PMU with the tendering and be a member of the evaluation team.

9. **Network Engineer.** Each network subteam will be assigned a network engineer, who will be responsible for surveys, coverage analysis, on-site installation works, and acceptance for all sites in accordance with the scope of work in the country for the SASEC regional network, the village network, and the research and training network. The responsibilities of the network engineer will be as follows:

- (i) Manage and coordinate all on-site activities under the direction of the team leader and design engineer.
- (ii) Oversee all implementation works to ensure compliance with specifications.
- (iii) Ensure that all sites are fit for the purpose in accordance with the plans developed by the design engineer.
- (iv) Ensure that all equipment delivered to the site is in working condition in accordance with the procedures outlined by the supplier as well as those outlined by the quality assurance manager.
- (v) Ensure that all equipment installed is in accordance with the supplier's specifications.
- (vi) Ensure that the site is left in a clean state upon the completion of all site works.
- (vii) Ensure that all site drawings are updated to reflect changes.
- (viii) Ensure site access for all direct personnel on the dates required.

- (ix) Ensure that all contractor personnel are fully equipped to undertake the tasks planned.
- (x) Ensure that all equipment failures/faults are reported to the design engineer and quality assurance manager immediately after they are found, and initiate rectification works if and when required.
- (xi) Survey all sites in accordance with the procedures developed by the design engineer and under the direct supervision of the project manager.
- (xii) Ensure that all site survey documentation is completed accurately and submitted to the design engineer on time.
- (xiii) Conduct physical coverage analysis of sites under the direction of the design engineer, and report the results.
- (xiv) Supervise the contractor's equipment installation work to ensure conformity with the specifications received from suppliers and the design engineer.
- (xv) Test all installed equipment to ensure that it is working in accordance with specifications, and report any discrepancy to the project manager.
- (xvi) Conduct acceptance of the sites in accordance with the procedures outlined by the design engineer and the quality assurance manager.
- (xvii) Ensure that the site is left in a clean state upon the completion of all site works.
- (xviii) Inform the team leader of any deviation from work plans and seek approval before changing work orders.
- (xix) Submit a monthly activity report to the team leader.

10. **Procurement Specialist.** The procurement specialist will assist the international procurement specialist in conducting all procurement and evaluation processes for all of the project elements, namely, the SASEC regional network, the village network, and the research and training network, as part of the attached TA. The responsibilities of the procurement specialist will be as follows:

- (i) Assist the international procurement specialist in preparing all procurement documentation and provide the latter with the country's rules and regulations for procurement.
- (ii) Assist the international procurement specialist in preparing the criteria for prequalification in consultation with the PMUs.
- (iii) Assist the international procurement specialist in preparing bid documents for (a) the contract package, combining the SASEC regional network and the SASEC village network into a single contract package; and (b) the contract package for the research and training network, combining the four SASEC countries into a single contract package in conformity with ADB's *Procurement Guidelines*.
- (iv) Assist the international procurement specialist in preparing evaluation criteria for technical proposals for each contract package in conformity with ADB's *Procurement Guidelines*.
- (v) Assist the PMUs with tendering, particularly with prequalification and the evaluation of technical proposals.
- (vi) Assist the international procurement specialist in establishing a logistic program for the delivery of equipment as well as quality procedures for its timely arrival on the site.
- (vii) Submit a monthly activity report to the team leader.

11. **Social Development Specialist.** The social development specialist will be part of the national joint team and be responsible for the selection of sites for connectivity to the SASEC

regional network and implementation of the CEC operational structure. The responsibilities of the social development specialist will be as follows:

- (i) Develop a work plan in consultation with the international team leader specifying the deliverables with a time frame, and implement the work plan with the guidance and instruction of the international team leader.
- (ii) Assist the PMU with the management of all CEC site selection activities in consultation with the design engineer.
- (iii) Review the village network plan to ensure that all social impact has been determined and that the sites will generate the greatest benefit to the community.
- (iv) Review the CEC site selection criteria and amend them where necessary.
- (v) Review the CEC basic requirements and amend them where necessary.
- (vi) Develop a CEC handbook for the operation of a CEC.
- (vii) Develop the selection criteria for the CEC operator and implement them in each selected CEC in consultation with the PMU.
- (viii) Develop a training manual for the sustainability (financial, service delivery) of the CECs.
- (ix) Assess and recommend applications that will generate the greatest benefit to the community.
- (x) Assess whether project implementation entails any safeguard compliance issue such as involuntary resettlement or indigenous people under ADB's safeguard compliance guidelines, and if any such issue is identified, assess its impact and recommend how to address it in the course of project implementation.
- (xi) Submit a monthly activity report to the international team leader.

12. **Environment Specialist.** The environment specialist will be part of the national joint team and will be responsible for assessing the environmental impact that may occur during the implementation of each of the project elements in the country and for recommending suitable measures to properly manage the impact. The responsibilities of the environment specialist will be as follows:

- (i) Develop a work plan in consultation with the international team leader specifying the deliverables with a time frame, and implement the work plan with the guidance and instruction of the international team leader.
- (ii) Manage and coordinate all environmental issues/impact that may arise in the course of project implementation.
- (iii) Accompany all survey teams to the site to assess possible environmental impact in accordance with ADB's *Environment Policy* (2002) and the environmental rules and regulations of the country.
- (iv) Report immediately all environmental issues, once identified, to the national team leader concerned and the international team leader, together with an assessment of their impact and suitable corrective measures.
- (v) Document all sites surveyed, assess any anticipated environmental impact, and determine that the sites satisfy the environmental requirements.
- (vi) Develop an environmental template for use at all sites, taking into consideration the type of work to be installed and the purpose for its use.
- (vii) Coordinate with the site owners to ensure cooperative management of environmental issues.
- (viii) Assist the site owners in rectifying environmental issues and maintain open communications at all times.
- (ix) Submit a monthly activity report to the international team leader.

13. **Quality Assurance Manager.** The quality assurance manager will be part of the national joint team and will be responsible for all quality management procedures for each of the project elements in the country. The responsibilities of the quality assurance manager will be as follows:

- (i) Develop a work plan in consultation with the international team leader specifying the deliverables with a time frame, and implement the work plan with the guidance and instruction of the international team leader.
- (ii) Manage and coordinate all quality assurance programs in consultation with the PMU.
- (iii) Develop the policy and procedures for survey, coverage, installation, and acceptance works to be undertaken, in conjunction with the design engineer, and monitor compliance.
- (iv) Develop the policy and procedures for factory acceptance (supplier) as well as equipment acceptance on-site by all implementing team members, and monitor compliance.
- (v) Develop a quality plan for installation works to be complied with by all network engineers.
- (vi) Develop a comprehensive document register for use by the project team, and monitor compliance.
- (vii) Follow up all equipment failures/faults to determine their cause, and recommend corrective actions to the project manager.
- (viii) Submit a monthly activity report to the international team leader.

DESIGN AND MONITORING FRAMEWORK FOR TECHNICAL ASSISTANCE

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
<p>Impact Improved human resources, regional knowledge, and innovation and businesses driven by local entrepreneurs for ICT in the SASEC subregion</p>	<p>10% yearly increase in the ICT literacy of rural people in the areas covered by the research and training network in SASEC countries, for 3 years after completion of the TA</p> <p>10% yearly increase in the number of ICT professionals and entrepreneurs in ICT businesses in the areas covered by the research and training network in SASEC countries, for 3 years after completion of the TA</p> <p>10% yearly increase in the number of websites, e-businesses, and applications newly developed in the areas covered by the research and training network in SASEC countries, for 3 years after completion of the TA</p>	<p>Compilation of government and ICT business associates statistics</p> <p>ADB evaluation missions or reports, or both</p>	<p>Assumption Favorable political support and economic activities at a regional level among the SASEC countries</p> <p>Risks Volatile political situation of some member countries and the associated slowdown of economic growth</p> <p>Slow progress in improvements in ICT business environment including access to financial services and lack of domestic ICT demand</p>
<p>Outcome High-quality research and training programs for communities, businesses, and government</p> <p>Community-driven innovations in ICT use through interactive communications, research, and training</p>	<p>Continuous increase in the number of training programs and the number of research papers produced by the SASEC research and training network</p> <p>Continuous increase in the number of online and off-line visits and traffic in the SASEC research and training network</p> <p>Continuous increase in the number of ideas and discussions exchanged between SASEC village networks and the SASEC research and training network, and in the number of business proposals made by local entrepreneurs</p>	<p>Service agencies' financial and management reports</p> <p>Project household, business, and government survey report</p> <p>ADB project completion report</p>	<p>Assumptions Proper implementation and enforcement of agreements between the SASEC countries and service agencies</p> <p>Existence of strong entrepreneurship and improving government support system</p> <p>Risk Communities and governments' resistance to and unfamiliarity with new technologies</p>

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
<p>Outputs</p> <p>1. SASEC research and training centers established in the four ICT research and training institutes connected with each other through the SASEC regional network</p> <p>2. A series of research and training programs developed and implemented</p> <p>3. Entrepreneurship and development support provided through an ICT innovation development fund</p>	<p>Necessary training equipment and network connection established in the selected research and training centers</p> <p>Training curriculum and research program developed and implemented</p> <p>Open content and online training program developed and implemented</p> <p>ICT innovation fund established</p> <p>Business proposals and entrepreneurs selected and development support provided</p> <p>Entrepreneurs successfully graduated</p>	<p>Service agencies' financial and management reports</p> <p>Project monitoring and progress reports</p> <p>Consultant reports</p> <p>ADB review missions</p>	<p>Assumptions</p> <p>Proper implementation and enforcement of agreements between the SASEC countries and service agencies</p> <p>Existence of strong entrepreneurship and ownership</p> <p>Strong coordination and collaboration among service agencies in all SASEC countries</p>
<p>Activities with Milestones</p> <p>SASEC Research and Training Network Establishment</p> <ol style="list-style-type: none"> 1. Review the methodologies, needs assessment results, technological infrastructure requirements, and recommendations of the research and training network study conducted through previous TA, within 1 month from the start of the present TA 2. Review the quality and performance of the national ICT sector innovation system in the SASEC countries, within 2 months from the start of the TA 3. Identify best practices and examples in the research and training network in the areas of e-learning, e-government, professional IT skill development, entrepreneurship, and community-driven innovation, within 3 months from the start of the TA 4. Design the operation and business model for the research and training network in consultation with the identified ICT research and training institutes and the governments, within 6 months from the start of the TA 5. Equip and establish the network, within 9 months from the start of the TA 6. Test-run the SASEC RTN operations, within 12 months from the start of the TA 7. Develop general guidelines and a handbook to be used for the operation of the research and training network, within 12 months from the start of the TA. <p>Research and Training Program</p> <ol style="list-style-type: none"> 1. Refine the needs assessment carried out in previous TA and identify the existing resources and capabilities in research and training in each SASEC country, within 3 months from the start of the TA 			<p>Inputs</p> <p>TA financing of \$4,400,000 on a grant basis from the Regional Cooperation and Integration Fund</p> <p>Governments' in-kind contribution to TA</p>

Activities with Milestones	Inputs
<p>2. Develop interactive communication methods with rural communities through the SASEC village network, and identify their training and entrepreneurship needs, within 5 months from the start of the TA</p> <p>3. Define the clientele of the training program and develop the training curriculum, within 8 months from the start of the TA</p> <p>4. Develop the research topics and programs on the basis of the community and business needs, within 9 months from the start of the TA</p> <p>5. Develop online training and collaborative regional research programs, within 12 months from the start of the TA</p> <p>6. Develop the ownership, operation, management, and business model for HRD programs, within 12 month from the start of the TA</p> <p>7. Provide online and off-line training programs and conduct research programs until the completion of the TA</p> <p>Entrepreneurship and Development Facility</p> <p>1. Develop the operation and management framework of the ICT innovation development fund and the process of selecting entrepreneurs, within 3 months from the start of the TA</p> <p>2. Develop awareness promotion programs, regional forums, regional workshops, and training programs to promote the use of the innovation development fund, within 6 months from the start of the TA</p> <p>3. Provide training and development support to the selected entrepreneurs and operate the e-business development fund until the completion of the Project</p>	

Source: Asian Development Bank estimates.

COST ESTIMATES AND FINANCING PLAN FOR TECHNICAL ASSISTANCE
(\$ '000)

Item	Total	Joint Cost	BAN	BHU	IND	NEP
Asian Development Bank Financing						
1. Connectivity and Equipment	2,040		510	510	510	510
2. Faculty and Assistance	768		192	192	192	192
3. Content Development Support and Incubation Period	1,000		250	250	250	250
4. Space Rental Support	192		48	48	48	48
5. Surveys	100	100				
6. Steering Committee Meeting	80	80				
7. Contingencies	220	220				
Total	4,400	400	1,000	1,000	1,000	1,000

BAN = Bangladesh, BHU = Bhutan, IND = India, NEP = Nepal.

Source: Asian Development Bank estimates.

SUMMARY POVERTY REDUCTION AND SOCIAL STRATEGY

A. Linkages to the Country Poverty Analysis

Is the sector identified as a national priority in country poverty analysis?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Is the sector identified as a national priority in country poverty partnership agreement?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<p>Contribution of the sector or subsector to reduce poverty in Bangladesh, Bhutan, India, and Nepal. As part of the South Asia region, Bangladesh, Bhutan, India, and Nepal are countries organized under the South Asia Subregional Economic Cooperation (SASEC) with different levels of socioeconomic development. While geography could be a factor, their varied features are basically attributed to the size of their lands, population, and types of industries. Agriculture is the backbone of their economy, but India is veering to trade at a moderate pace. Poverty incidence remains high: Bangladesh has the highest, at 49.8%, while Bhutan has 25.3% and Nepal, 30.9%. In India, people living below the poverty line compose 26.1% of the total population but the proportion is declining, though slowly, as poverty remains widespread in the country.</p> <p>The main causes of poverty differ from country to country, but the common factors are observed to be as follows: (i) low literacy rates, (ii) high population growth, (iii) periodic natural disasters, (iv) lack of employment and economic opportunities, and (v) lack of access to public information as well as poor government schemes and programs for the poor.</p> <p>The transport and communications sector in the four SASEC countries has been consistently growing over the last 5 years (2001–2005), with Bhutan and India achieving double-digit growth rates in 2004 and 2005 that averaged 14% and 11%, respectively. At constant prices, the share of the sector in the gross domestic product (GDP) of these countries is modest: 9% for Bangladesh, 10% for Bhutan, and 8% for Nepal. India may be considered an exception, as its transport and communications sector accounts for 25% of GDP. The year-to-year expansion of this sector has contributed to poverty reduction in the four countries.</p> <p>With information and communication technology (ICT) becoming important to communications, the four national governments have emphasized their need in various social services like education, health, agriculture, tourism, and trade. ICT will hasten the delivery of information to people, particularly in remote areas. As the Project is designed for intercountry connectivity between Bangladesh, Bhutan, India, and Nepal, more information will be accessible to the people. Cheap data transfer, research and development, and retooling of skills will be facilitated. Overall, the Project will open up more entrepreneurial, economic, and educational opportunities which are essential to poverty reduction in the four countries.</p>			
B. Poverty Analysis:		Targeting Classification: General intervention	
<p>The Project will bring about tangible economic growth and social benefits to the people in the four countries. The common causes of poverty having been identified, the information highway will be instrumental in providing these people with educational information or access to innovative technology, especially in agriculture, trade, and education.</p> <p>Preliminary discussions with the people in Bangladesh and Nepal indicate that information related to agriculture and health will have a direct impact on their quality of life. The information is also important in resolving petty health cases through local-language interactive programs with international and domestic doctors providing consultancy through community e-centers (CECs). In addition, the Project will be an important tool for gaining access to distance learning. India is an ideal partner under the Project, being the most developed among the four countries. It has great experience in research and development training (RDT) systems and in the operation of village e-kiosks; this experience can be transferred to the three other countries.</p>			

C. Participation Process

Is there a stakeholder analysis? Yes No
 Is there a participation strategy? Yes No

Consultations were conducted with government officials, key functionaries, and selected communities in three countries, except in India, where CECs will not be established. The consultations were aimed at acquiring a better understanding of the socioeconomic conditions of the people and gauging their views on project development.

Group discussions among women and the communities were held to capture social and economic standards and also to assess the impact that the Project will have on their lives. These discussions and consultations confirmed the need for this Project and drew a positive response of the communities and different stakeholders, particularly those in the rural areas. The participants acknowledged the fact that lack of appropriate and timely information has affected their exposure to development and their progress.

Participation and ownership among the communities has to be encouraged for the sustainability of this project. Further awareness programs should be carried out to provide the right feedback to the communities on the implementation of the Project and its utility.

D. Gender Development**Strategy to maximize impact on women:**

Gender participation was ensured during the field visits through focus group discussions with local women belonging to different socioeconomic groups.

The discussions brought out information about the benefits that the Project will have for women: access of girls to higher education; access to information on prenatal and postnatal care; better awareness of nutrition during pregnancy; information about immunization; feminine hygiene practices; etc. The women also said that issues that cannot be discussed with men or in the general public can be dealt with through the interactive programs with reputed doctors in a closed room and their problems can be shared and solutions received through this mode.

Has an output been prepared? Yes No

E. Social Safeguards and Other Social Risks

Item	Significant/ Not Significant/ None	Strategy to Address Issues	Plan Required
Resettlement	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input checked="" type="checkbox"/> None	<p>The Project has been developed in such a manner that there will be no need for land acquisition and resettlement. By developing the information highway data transfer facility and by housing the CECs within existing buildings in rural areas, the need for land has been avoided. Similarly, the building for the data center will be built on government land within the ISP premises.</p> <p>Therefore, the Project will require no land acquisition or resettlement, and hence no resettlement plan.</p>	<input type="checkbox"/> Full <input type="checkbox"/> Short <input type="checkbox"/> RF <input checked="" type="checkbox"/> None

Item	Significant/ Not Significant/ None	Strategy to Address Issues	Plan Required
Affordability	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input checked="" type="checkbox"/> None	User charges will be nominal and, as evident from the socioeconomic survey, users are willing to pay the charges.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Labor	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input checked="" type="checkbox"/> None	The Project has no negative impact on the labor market or retrenchment. Social safeguards for labor issues are not applicable. The Project will create employment opportunities in the region.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Indigenous Peoples	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input checked="" type="checkbox"/> None	The positive impact on IP is very similar to the impact on non-IPs. Therefore, no IPDP is required.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> IPDF
Other Risks or Vulnerabilities	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	The Executing Agency (EA) will ensure that the civil works for the data center comply with all applicable labor laws, do not employ child labor in construction activities, encourage the employment of the poor particularly women, and do not differentiate between men and women when it comes to wages particularly for work of equal value.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

A. Introduction

1. This summary initial environmental examination is based on the initial environmental examination of the proposed South Asia Subregional Economic Cooperation (SASEC) Information Highway Project. The initial environmental examination was prepared for the investment project, which will (i) establish robust data interchange capacity between all four SASEC member countries (Bangladesh, Bhutan, India, and Nepal) with reduced costs and an increase in reliability and competition, providing efficient access with redundancy to submarine cables for Nepal and Bhutan, and also reduce dependency on satellite links, enhance local peering, and reduce latency; (ii) develop village networks for SASEC regional village communities to enable rural information and communication technology (ICT) development; and (iii) develop ICT training and research centers as part of the piggybacked technical assistance (TA).

2. The Project is in category C, according to the *Environmental Assessment Guidelines* (2003) of the Asian Development Bank (ADB).

3. The environmental assessment was carried out between July and August 2007, on the basis of secondary data and field visits. The initial environmental examination report conformed to the relevant laws and regulations of the governments of Bangladesh, Bhutan, India, and Nepal, and ADB's *Environment Policy* (2002) and *Environmental Assessment Requirements* (2003).

B. Description of the Project

1. Project Components and Locations

4. The SASEC regional network (SASECRN) proposed under TA 6358-REG will comprise four network access gateways (co-location facilities), one in each country, linked to a border township within the country for connectivity to other countries. The border-connectivity townships are effectively strategic cable landing points in the SASEC countries. In-country and cross-border links are the carrier links for the SASECRN.

5. The SASECRN is aimed at expanding ICT facilities in rural areas and setting up village networks and community electronic centers (CECs). At the village level, the CECs become connection points for interaction with the SASECRN. Also, CECs can operate as hubs for other CECs in the local area, thus enlarging the network coverage.

6. A regional ICT training and research center will be set up in each SASEC country.

2. Proposed Project Activities: Country-Specific

7. The SASECRN will maximize the use of existing infrastructure throughout each country. The project activities in each country will be planned so as to establish in-country and cross-border links using the existing or upgraded fiber-optic cable network or a new network developed along existing power transmission lines. Preference is given to overhead environment (optical power ground wire [OPGW]), which is safe from flooding, land subsidence, and vandalism. Co-location sites with existing requisite facilities like air-conditioning, backup power, space, and building security will also be selected. The border-connectivity townships will have access to existing telecommunication and power transmission infrastructure, and can be

reached through good roads.

C. Description of the Environment

8. The project area is spread all over the country in Bangladesh, Bhutan, and Nepal. India has minimal interface with the environment since most of the required infrastructure is available for the Project. The project activities in the four countries have environmental interface primarily with respect to topographical, soil, and biological/valuable ecological component (VEC).

9. The Project requires the identification of co-location facilities, in-country and cross-border links, and village network locations. The project design is based on the use of existing infrastructure in each country. The co-location sites (network access gateways), one in each country, will be identified on the basis of availability of requisite space, facilities, and connectivity to in-country links. The in-country and cross-border links will have the requisite connectivity between the access gateway and border-connectivity townships, right-of-way (ROW), and access to the links. The border-connectivity townships will be those where connectivity to India's border-connectivity township already exists or can be easily established without causing significant environmental impact. CECs will be identified with the availability of space and the requisite facilities in mind. The project components and activities will therefore have very limited environmental interface. For this reason, the Project is classified as category C. An alternative analysis is usually carried out to enable the project proponent to adopt environmentally acceptable options. But since the Project has limited environmental interface, and project design has adopted the best feasible options, no alternative analysis was carried out.

D. Anticipated Environmental Impact and Mitigation Measures

10. The project impact is categorized into two phases: (i) impact during design and development, and (ii) impact during operation. The impact on identified VECs in each country is described here, along with the mitigation measures required at different phases of the Project.

11. The potential impact of the Project is directly linked to the likely interface of project activities with the environment, as detailed above in the Description of the Project section. The proposed activities in the four countries are not likely to have any significant impact on air quality, noise levels, and water resources. The impact is likely to be confined to loss of vegetation and trees, and soil contamination. On the other hand, the Project will facilitate the flow of updated information about better agricultural practices and employment opportunities, which will catalyze the overall socioeconomic development of the area. The identified potential impact due to the proposed SASEC Information Highway Project is summarized in the following sections.

1. Nepal

a. Design and Development

12. The environmental impact was assessed on the basis of the proposed design of the network access gateways (co-location facilities), in-country link access, and border connectivity. Since most of the above facilities already have the requisite infrastructure, the required ROW, and access to the site, no direct significant impact is anticipated from the proposed development. The development of CECs may have associated impact if these are set up on new sites and in remote areas. All the five CEC locations already selected under this TA 6358 are well connected and are proposed to be set up in existing buildings. The wireless connectivity poles, which are proposed to be set up in consideration of line of sight, may involve

site-clearing activity in small areas as well as creation of access to the proposed pole locations. These activities may have direct impact in terms of cutting of trees and compaction of soil (from vehicular movement), though the impact will be smaller in magnitude.

13. To avoid any environmental impact due to CECs and wireless connectivity development, efforts will be made to select the pole locations such that no loss of trees is involved. Wherever tree cutting is unavoidable, provision will be made for compensatory afforestation (25 trees planted for every tree cut, according to the practice in Nepal). Nepal has several protected areas¹ (eight national parks, three conservation areas, three wildlife reserves). Efforts are to be made to avoid routing any fiber-optic link or setting up wireless connectivity pole for CEC development in the protected areas. The CECs or co-location sites should not be located in flood-prone areas. Nepal is in an earthquake-prone area. This fact should be considered in the structural design of the CECs or co-location site building.

b. Operation

14. The operational activity of the SASECRN (in-country network and cross-border links) may require some maintenance activity. However, because of the availability of access and unlikely generation of any waste, no environmental impact is anticipated from these networks. The co-location site may generate e-waste and used uninterruptible power supply batteries, though in very small quantities and over a long period of time. The uncontrolled disposal of these wastes can have a harmful impact on the environment (like soil contamination). If power backup is also provided through a diesel generating set, there may be noise and air pollution. Similarly, the operation of the CECs may generate office consumable waste and e-waste. Since CECs are located in remote areas where sanitation facilities may not be adequate, the uncontrolled discharge of domestic sewage may create sanitation problems and unhygienic conditions.

15. To mitigate the likely environmental impact, the recycling of e-waste and used UPS batteries through the supplier of these items is proposed. The network access gateways and CECs are to be equipped with requisite firefighting facilities. A septic tank for treating domestic sewage at the CECs is also to be provided. If backup power is provided through a diesel generating set, then provision will be made to ensure adequate stack height with muffler and acoustic enclosure to prevent air and noise pollution.

2. Bhutan

a. Design and Development

16. The impact identified for the network access gateways (co-location facilities), in-country link access, border connectivity, and CECs is the same as that assessed for Nepal since the activities involved are similar except for the laying of alternate fiber-optic links along the Bhutan Power Transmission route. The Bhutan Power Transmission link already exists and has the requisite ROW and access to the tower sites. Different techniques may be adopted for laying the OPGW link. However, all the techniques involve, primarily, manual work. As such, they will not cause any significant environmental impact. Clearing the constrained access may cause some loss of vegetation.

¹ Department of Forest Research and Survey. 1999. *Forest and Shrub Cover of Nepal*. Kathmandu (May); and Department of National Parks and Wildlife Conservation. 2006. *Forging Partnerships in Promoting Sustainable Livelihoods*. Kathmandu.

17. To avoid any environmental impact due to CECs and wireless connectivity development, efforts are to be made to select the pole locations such that no loss of trees is involved. Wherever tree cutting is unavoidable, provision will be made for compensatory afforestation (preferably two trees planted for every tree cut). Bhutan has several protected areas² (four national parks, three sanctuaries). Efforts are to be made to avoid routing any fiber-optic or wireless connectivity (pole fixation) for CEC development in protected areas. No protected areas are located close to the border-connectivity town or the western part of Bhutan.

b. Operation

18. The impact identified and mitigation measures suggested are the same as those indicated for Nepal.

3. Bangladesh

a. Design and Development

19. The impact identified for the network access gateways (co-location facilities) and in-country link access are the same as those identified for Nepal. The cross-border links between Panchagarh and Phulbari are yet to be developed. The fiber-optic link is proposed to be laid within the ROW of the existing highway. This activity may lead to loss of tree cover, soil compaction or erosion, and siltation of water bodies. The construction of the CEC building may create localized air and noise pollution during construction.

20. The mitigation measures proposed for Bangladesh will be the same as those for Nepal. Additionally, precaution has to be taken when aligning the cross-border links to minimize loss of vegetation or trees, and to make sure that no construction waste finds its way to water bodies. Water should be sprayed on loose material to prevent dust generation during the construction of the building. An external covering curtain is to be used. Construction wastes should be disposed of in low-lying areas as filling material. Personal protective equipment should be provided to construction workers. CECs should not be located in flood-prone areas. Septic tanks for treating domestic sewage should be provided.

b. Operation

21. The impact identified and mitigation measures suggested are the same as those for Nepal.

4. India

22. Design, Development, and Operation. The impact identified will be limited in the case of the provision of links between Panchgarg and Phulbari. The mitigation measures with respect to the laying of the links will be same as those indicated for Bangladesh above. The construction of the CEC building may create localized air and noise pollution during construction. The impact identified for the construction of the regional research and training center building will be the same as that for similar construction in Bangladesh. The mitigation measures will also be the same.

² Department of Forest, Ministry of Agriculture, Government of Bhutan.

E. Environmental Management Plan

1. Key Mitigation and Monitoring Actions

23. The environmental management plan (EMP) is aimed at ensuring that the adverse impact associated with the Project is properly mitigated to an acceptable level through the most technically and economically feasible option, if not prevented outright. The EMP will also ensure that the positive impact is sustained and enhanced. The EMP consists of a set of mitigation, monitoring, and institutional measures to be taken in a time-bound manner during the design, construction, and operation stages of the Project. The EMP also includes the actions needed for the implementation of these measures. The EMP has been developed, but no detailed environmental monitoring plan has been prepared at this stage because the residual impact is assumed to be insignificant. The monitoring proposed is to be limited to ensuring compliance with EMP commitments.

a. Implementation Period for Mitigation Measures

24. The mitigation measures to be implemented will depend on the nature of the impact associated with the various project activities. The implementation period will coincide with the final project implementation schedule.

b. Contingency Response Plan

25. The Project may have one primary environmental emergency—fire at access gateways, CECs, and border-connectivity townships—plus pollution and waste discharge. The requisite fire protection infrastructure should be provided at these locations. A communication system for exclusively this purpose should also be established with fire departments.

c. Authorities and Implementation Responsibility

26. The authorities and responsibilities for the implementation of the EMP should reside with the country executing agencies (EAs). All policy decisions, including the incorporation of the EMP requirements, will be the responsibility of the EAs, which will ensure, through responsible departments, that the environmental mitigation measures are implemented effectively. For this purpose, the EAs will designate officials to coordinate activities related to EMP implementation. Those officials may hire external consultants for any additional environmental assessment.

2. Institutional Capacity to Implement and Sustain Mitigation and Monitoring

27. The SASEC countries do not have environment departments or officials. For the effective implementation of the EMP, at least one officer will be designated to coordinate environmental activities. This official will be trained to manage environmental aspects and undertake environmental assessment for the development of new CECs as well as the development and upgrading of in-country and cross-border links.

F. Public Consultation

28. Government and public perceptions of the Project were elicited in informal and ad hoc public consultations from 31 July to 3 August 2007 in Bhutan and Nepal, which were attended by about 15 persons. The discussion focused mainly on the development of CECs, their facilities, and the setting up of wireless networks, which may require limited site clearing. The outcome of the public consultations was very positive and the villagers were supportive of the

Project. The consultations indicated that environmental awareness among the public may be enhanced with the help of e-centers.

29. Formal consultations and meetings were held with government officials from the environmental, forest, and biodiversity departments in the four countries. The officials were apprised of the project components and the likely regulatory interfaces. From the discussions, it was learned that no legislative clearance may be required if existing infrastructure is to be used. However, for newer developments or site clearance, prior approval must be obtained under applicable environmental laws. The applicable requirements have been assessed and have already been incorporated into the EMP.

30. E-waste is not yet a priority concern in any of the countries. No legislation governing e-waste is in place. At any rate, e-waste from the Project is likely to be very small in quantity and generated over a long span of time. Recycling or reuse of e-waste is considered to be the best management option.

G. Conclusions and Recommendation

31. The proposed project components will cause insignificant adverse environmental impact. Environmental impact is likely to be caused by the development of CECs and cross-border links between Bangladesh and India. Some impact is also likely to be caused during the operation of network access gateways, border township facilities, and CECs. The impact is associated with the disposal of office and e-waste, which is recyclable, and domestic sewage, which can be fully treated. The implementation of prescribed mitigation measures will minimize the predicted impact during project design and development as well as operation.

32. The development of CECs, the setting up of wireless connectivity poles, and the development of cross-border links between Bangladesh and India may require the cutting of trees, the development of access, or the acquisition and clearing of additional land. If so, the provisions of the following country-specific environmental laws with respect to obtaining permission for the felling of trees, the diversion of forestland, and environment protection are to be followed:

- (i) Bhutan: Forests and Nature Conservation Act of Bhutan (1995), Rules (2006), and Environment Assessment Act (2000)/Rules (2002).
- (ii) Nepal: Environment Protection Act (1997)/Rules (1997) and National Park and Wild Life Conservation Act (1973)/Rules (1974) (amended 1985).
- (iii) Bangladesh: Environment Conservation Act (1995), The Forest Act (1927) (amended 2000).
- (iv) India: Environment (Protection) Act, 1986 (amended 2006) and Forests Conservation Act. 1980 (amended 1988).

33. The environmental assessment was carried out at the project preparatory stage. The alignment for connectivity between Bangladesh and India is yet to be firmed up, and so is the additional CECs or wireless connectivity routing. These activities and any change in the activities defined under Section II above may require the preparation of additional environmental assessment, which must be submitted to ADB for approval. The EMP also needs to be revised accordingly. The necessary environmental clearances in the various countries must also be obtained before the start of the activity.

ECONOMIC ANALYSIS

A. Introduction

1. The proposed Project comprises SASEC regional network (SASECRN), which is to establish robust data interchange capacity among the four SASEC member countries, and SASEC village network (SASECVN). SASECRN will replace microwave facilities, providing efficient access, with redundancy, to submarine cables for Bhutan and Nepal. It will lower internet connecting costs and increase service reliability and competition, thereby promoting an efficient use of network services (e.g., reducing latency and enhancing local peering). SASECVN is to expand ICT-accessibility and ICT-enabled service¹ in remote rural areas through the establishment of networks serving village communities in the countries. SASECVN has been integrated into the Project to spread the benefits of SASECRN over a wider cross-section of rural poor communities in the countries. The integrated approach will ensure to improve the rural communities' accessibility to information and economic opportunities, and thereby maximize the Project's benefits.

2. The Project will be implemented over 2 years. The economic analysis covers the following 15 years of full operation. Economic evaluation was undertaken using 2007 prices. The residual values of SASECRN and SASECVN were assumed to be 10% of their acquisition cost. The operation and maintenance costs for optical fiber were assessed at 2% of its annual installation cost, and operation and maintenance costs for computer equipment at 3% for the first three years then increasing by 100 basis points each for three years as the equipment ages. All cost elements were valued at border prices, using a world price numeraire, with all taxes and duties excluded. A standard conversion factor of 0.9 was applied to non-tradable items and labors.

B. Project Benefits

1. SASEC-Regional Network

3. The economic internal rate of return (EIRR) of the Project was estimated by comparing the project case with a base case involving the continued use of the satellite. The installation of the regional network will enable to connect the cable landing stations (CLS)² in Bangladesh and India to an access gateway, and then distribute internet capacity to Nepal and Bhutan via terrestrial links.

4. The economic benefits include: (i) savings in the cost connecting the internet service as a result of SASECRN (accrued to Nepal and Bhutan), and (ii) incremental revenues which will be paid by Nepal and Bhutan for the connection with CLS (accrued to India and Bangladesh). Other economic indirect benefits over time include increased incomes and economic activities resulting from improved access to information and markets. But, these are, hardly quantifiable, not included.

5. Without the Project, Nepal and Bhutan, which are currently not connected with any CLS, have to depend on satellite to access internet, in particular very small aperture terminals (VSAT). VSAT are twice expensive in general than terrestrial links through CLS. At present, a per-megabyte per-month cost for VSAT is about \$1,500. At present, the maximum capacity of

¹ ICT-enabled services include voice, chatting, video conference, education, health, and governance.

² It refers to the location where a submarine or other underwater cable makes landfall

internet access from VSAT allocated to Nepal and Bhutan is 200 megabytes and 40 megabytes, respectively.

6. With the Project, Nepal and Bhutan will have a better option: instead of relying on expensive satellite to access internet, they will attain bigger internet access capacity from CLS, with the negotiated payment of operation fees to India and Bangladesh. The internet access capacity that Nepal and Bhutan can purchase will be at minimum about three times bigger, amounting to a total of 775 megabytes per month: 620 megabytes and 155 megabytes for Nepal and Bhutan, respectively.

7. With the implementation of SASECRN, the costs that Nepal and Bhutan need to pay to connect CLS through Bangladesh or India consist of land costs of internet capacity, in-country haulage cost to the access gateway, and cross-border haulage to the access gateway. Details are as follow:

- (i) **Landed cost of internet capacity.** India has two CLS and Bangladesh one and the comparable cost is about \$500 per month per megabyte regardless of the landing.
- (ii) **In-country haulage cost to the access gateway.** India's cost for in-country haulage is based on prevailing prices offered by three carriers: RailTel, PGCI, and BSNL. The cost is a regulated price and is based on distance, however, all carriers can discount this cost to suit the market. In case of Bangladesh, no market price is available. It is assumed that the price, once set in the market, will be in the level that may be comparable to India.
- (iii) **Cross-border haulage to the access gateway** – Both Nepal and Bhutan will need to haul the internet capacity to their respective Access Gateways. The cost used for this analysis was confirmed by the individual in-country carriers through the consultation process.

8. Table A12.1 shows the comparable cost for internet capacity. Incremental revenues incurred to India and Bangladesh as a result of the Project was computed by summing total revenues collecting from Nepal and Bhutan for their access to CLS. The increased capacity for Bhutan and Nepal was assumed to be absorbed for a period of 5 years after completion of the SASECRN.

Table A12.1: Comparable Cost for Internet Capacity

Item	Rail Tel	PGCI	BSNL
International internet cost	\$ 500.00	\$ 500.00	\$ 500.00
In-country internet haulage cost	\$ 149.69	\$ 104.61	\$ 146.13
In-country haulage costs			
Bhutan terrestrial network	\$ 73.03	\$ 73.03	\$ 73.03
Nepal terrestrial network	\$ 55.35	\$ 55.35	\$ 55.35
Per megabyte per month cost for Bhutan	\$ 722.72	\$ 677.64	\$ 719.16
Per megabyte per month cost for Nepal	\$705.04	\$ 659.96	\$701.48
VSAT cost per megabyte per month currently paid by Bhutan and Nepal: \$1,500			
Potential per megabyte per month cost savings for Bhutan	\$ 777.28	\$ 822.36	\$ 780.84
Potential per megabyte per month cost savings for Nepal	\$ 794.96	\$ 840.04	\$ 798.96
Current capacity (megabytes per month) of Bhutan through VSAT	40	40	40
Current capacity (megabytes per month) of Nepal through VSAT	200	200	200
Cost saving per month for Bhutan	\$ 31,091.20	\$32,894.40	\$ 31,233.60
Cost saving per month for Nepal	\$158,992.00	\$168,008.00	\$159,792.00

BSNL = bharat sanchar nigam ltd., PGCI = power grid corporation of India, VSAT = very small aperture terminals,

Source: Consultant's report.

2. SASEC Village Network

9. **Agriculture Productivity Increase.** Research suggests that increasing agricultural productivity benefits the poor and landless through increased employment opportunities. Considering the vast majority of poor people live in rural areas and derive their livelihoods directly or indirectly from agriculture, support for farming is a high priority for rural development. ICT can deliver useful information/data to farmers in the form of crop care, animal husbandry, fertilizer and feedstock inputs, drought mitigation, pest control, irrigation, weather forecasting, seed sourcing and market demand and prices. Again India has shown the way forward in the delivery of economic benefits through ICT deployment in agriculture. An illustration is the use of a network of tele-centers to coordinate the planting of tomatoes in order to achieve a constant supply to the markets at a more regulated and regular price. Previously the farmers unknowingly harvested their produce at the same time creating an oversupply at one given time thus reducing price and conversely when there was a high demand, the produce was not available.

10. It is through this illustration that ICT agricultural enabled applications can deliver significant economic benefit and the timely delivery of seasonal weather information will improve the yield of certain crops, particularly rice. Current crop production of rice yields approximately 20 quintals per acre at an average price of around \$ 30 per quintal. The average crop yield is about one per annum for a farmer with little forecasting information available. Given the correct weather information a farmer can triple his yield over one year by implementing preventive

drought measures, re-directing water supplies and preventive care measures for the farm. As per the aforementioned illustration, this is achieved through the network delivering timely and accurate information to the farmers. The project will deliver connectivity to 110 rural communities where rice production is predominant. The mean acreage per community has been assessed at 5 acres and the additional yield per annum is assumed to be one fold of the current yields being experienced as an average throughout the member countries. This agricultural productivity improvement is considered in the EIRR calculation.

11. **CeCs Employment Creation.** There are 3 areas of employment opportunity that arises from the implementation of the Project, namely (i) unemployed people can use the network to discover job opportunities; (ii) they can become employed in new jobs that are created through the deployment of ICTs; and (iii) they are up-skilled via specific education programs that support the SASEC regional network and CEC deployment. Based on the India experience, the new job creation delivered from the opening of telecenters is about 2 new jobs per centre. The up-skilling of employed people is about the same per telecenter location once delivery either from distance learning programs or the use of appropriate training institutes. For this analysis the new job creation has been assessed at the lowest possible earning capacity and being a mean across the member countries of \$ 50 per month and an up-skilled worker (being employed on the lowest possible earning capacity) incremental change being an additional \$ 30 per month. This improvement is considered in the EIRR calculation.

C. EIRR and Sensitivity Analysis

12. The EIRR of the Project was estimated at 34.3%. The economic cost and benefit streams are in Table A12.2. The sensitivity of the EIRR was tested for the cases (i) when no indirect benefits are included; (ii) when the project benefits are reduced by 20%; (iii) when the project cost increases by 20%; and (iv) when case (ii) and case (iii) are combined. The results of the sensitivity analysis are shown in Table A12.3.

Table A12.2: Project Cost and Benefits Stream

Year	Project Cost			Project Benefits			Net Total
	Initial Investment	Operation and Maintenance	Total	Direct Benefits	Indirect Benefits	Total	
2008	969		969			0	(969)
2009	12,230		12,230			0	(19,230)
2010		245	245	5,172	547	5,719	5,474
2011		245	245	6,025	547	6,571	6,326
2012		245	245	6,877	547	7,424	7,179
2013		327	327	7,729	547	8,276	7,949
2014		327	327	8,581	547	9,128	8,802
2015		327	327	8,581	547	9,128	8,802
2016		408	408	8,581	547	9,128	8,720
2017		408	408	8,581	547	9,128	8,720
2018		408	408	8,581	547	9,128	8,720
2019		490	490	8,581	547	9,128	8,638
2020		490	490	8,581	547	9,128	8,638
2021		490	490	8,581	547	9,128	8,638
2022		572	572	8,581	547	9,128	8,557
2023		572	572	8,581	547	9,128	8,557
2024	(2,020)	572	(1,448)	8,581	547	9,128	10,576

() = negative.

Source: Asian Development Bank estimates.

Table A12.3: Sensitivity Analysis

Case	EIRR (%)
No indirect benefits included	31.9
Project benefits reduced by 20%	27.6
Project cost increased by 20%	28.7
Project benefits reduced by 20% and project cost increased by 20%	22.7

EIRR = economic internal rate of return.

Source: Asian Development Bank estimates.