Cambodia:
ICT Assessment

14-29 June 2001

Cambodia: ICT Assessment

Management Summary

This ICT assessment has been undertaken at the request of the USAID Mission for Cambodia, located in Phnom Penh. The assessment is being undertaken in support of USAID's Asia and Near East Bureau's Information and Communication Technology program.

This Assessment has been built around the Asia and Near East (ANE) Bureau's framework of four "Ps": 1) ***Policy***—opening doors through policy reform to permit the introduction and growth of Information and Communication Technologies (ICTs), reducing barriers to open connectivity, and ensuring that global electronic commerce can take place in an open and transparent fashion, 2) ***Pipes***—demonstrating the effectiveness of appropriate hardware and software by utilizing the latest in technology such as wireless, high speed data transfer, secure transaction capability, extending the Internet to underserved areas, and working with private sector Internet service providers (ISPs) to offer a range of services to clients; 3) ***Private Sector***—ensuring the private sector "can do what it needs to do to be successful." This entails combining "policy" reform and "pipes" improvement with ensuring there are sufficient, well trained technicians to support the build-out of ICT industries, and 4) ***People***—Implementing new approaches to sustainable social and economic development through ICT tools. It is critical to the success of the program that USAID's partners use the Internet and other ICTs as tools for development.

The on-the-ground ICT assessment activities were carried out between 14-29 June 2001. The Team included individuals provided through SETA Corporation and Academy for Educational Development (AED), with assistance from USAID/Cambodia technical personnel. In addition, this ICT assessment coordinated closely with the World Bank and the Government of Japan in an effort to identify and coordinate opportunities for partnering and/or to undertake collaborative and supporting activities.

The following provides a very brief overview of the findings and recommendations contained in this ICT assessment. The ICT assessment has been constructed with two sets of recommendations—one set contained within this report and for broad dissemination, and a second smaller subset that is directed toward the USAID/Cambodia Mission and is reflected in a separate document.

- **Policy**—The Royal Government of Cambodia (RGC), through its Ministry of Post and Telecommunications (MPTC), has moved increasingly toward opening up the sector to the private sector. A draft Telecommunications Law has been prepared and is under refinement and review, as has a draft E-Commerce Law been prepared to deal with electronic/digital signature, certification, and security-related issues. While Intellectual Property Rights (IPR) Laws are on the books, these are not up to international standards nor are the adherence to these existing laws adequate. Current dynamics are taking place to separate the telecommunications policy/regulatory functions from the telecommunications and Internet operations within the MPTC. A new National Information Communications Technology Development Authority

(NIDA) was formed in August 2000, and is currently in the process of developing an IT Master Strategy for Cambodia. A public seminar is scheduled for September 2001 to receive comments. Recommendations are consistent with the direction currently being undertaken, with the focus being on speeding up the process and ensuring an open and transparent regulatory process that provides the needed consistency and predictability that is essential for growth. The Ministry of Commerce is also actively engaged in this arena with work being undertaken in conjunction with the eASEAN Task Force.

- **Pipes**—The growth of mobile cellular telephony within Cambodia has been significant within the past two years. At present over 75 percent of the country's telephony is provided via wireless technologies, with expansion continuing into a growing number of Provincial cities and neighboring rural areas. Internet use is primarily limited to E-mail, and here too there is expansion being provided via broadband wireless services in selected locations within Cambodia. While access is expanding, costs for this access is amongst the highest in the world. Recommendations with regard to Pipes are primarily in the Policy arena (e.g., creating the enabling environment for the private sector to invest in the pipes) and in expanding access to more rural areas of Cambodia where approximately 85 percent of the nation's population live.[1]

- **Private Sector**—With the growing availability of telecommunications and the Internet, its use by the private sector is becoming more common. Where in recent years this growth has primarily been limited to international and larger businesses, expanded use of ICTs is now taking place in small and medium sized enterprises (SMEs). More recent growth has been even occurring at the individual level where mobile cellular is becoming more and more common by those living in urban areas. Recommendations focus on expanding the educational quality of technical resources within Cambodia's universities, and high-tech SMEs providing technical services, and in expanding the use of ICTs/Internet by the local and small tourist-related firms.

- **People**—The focus of the ICT assessment with respect to People was predominantly the current development portfolio for USAID/Cambodia. As a general rule, most international NGOs supporting USAID make use of the Internet as do a number of the local NGOs with offices in Phnom Penh. This use is primarily for communications via e-mail, though there are some local NGOs starting to develop websites in order to expand their services. Outside of Phnom Penh, however, the use of e-mail predominates and even here the use drops off significantly with regard to communicating with activities located in the provinces and rural areas. The recommendations here focus on expanded awareness and education as to the use of ICTs/Internet and in improving access to more rural locations via shared Community Access Points (CAPs) that can be established and supported by the NGO community working in these areas.

[1] World Bank Group. Cambodia Data Profile and Cambodia at Glance. 1999 data.

The ICT assessment team wishes to thank the USAID/Cambodia Mission for the opportunity to work with them during the course of this Assessment and for their support throughout the two weeks in country. In addition, the team wishes to thank those within the various RGC ministries, donor organizations, universities, NGOs and private sector firms who were so generous with their time and patience during the course of our conversations. We trust this combined effort will lead toward some meaningful ICT-related activities that will bring about substantive improvements within Cambodia.

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Abbreviations and Acronyms

ADB	Asian Development Bank
ACLEDA	Association of Cambodian Local Economic Development Agencies
AED	Academy for Educational Development
ANE	Asia Near East (regional bureau of USAID/Washington)
APEC	Asia Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
ATM	Asynchronous Transport Mode
B2B	Business to Business (electronic commerce)
B2C	Business to Consumer (electronic commerce)
BLS	Bureau of Labor Statistics (U.S. Department of Commerce)
BTA	Basic Telecommunications Agreement (WTO)
CAGR	Compound Annual Growth Rate
CAP	Community Access Point
CHA	Cambodian Handicraft Association (CHA) for Landmine and Polio
CIC	Community Information Center
CMM	Capability Maturity Model (Software Engineering Institute)
CRS	Catholic Relief Services
CSPO	Cambodian School of Prosthetics and Orthotics
DAC	Disability Action Council
DBMS	Data Base Management System
DCOF	Displaced Children and Orphans Funds
DOC	U.S. Department of Commerce
DOT Force	Digital Opportunity Task Force
EDA	U.S. Department of Commerce's Economic Development Administration
EDI	Electronic Data Interchange
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GNP	Gross National Product

GOJ	Government of Japan
GPS	Global Positioning Systems
GSM	Global System for Mobile Communications
HI	Handicap International
HEV	Health and Education Volunteers
IAS	International Accounting Standards
ICT	Information and Communications Technologies
IED	Internet for Economic Development
IEEE	Institute for Electronics and Electrical Engineers
IESC	International Executive Service Corps
IFC	International Finance Corporation (WB)
IMF	International Monetary Fund
IPR	Intellectual Property Rights
ISDN	Integrated Services Digital Network
ISA	Industrial Sector Analysis (ISA)
ISO	International Standards Organization (e.g., ISO 9000)
ISP	Internet Service Provider
IT	Information Technology
ITA	Information Technology Agreement (WTO)
ITAA	Information Technology Association of America
ITG	Information Technology Group at Center for International Development at Harvard University
ITU	International Telecommunications Union (UN)
JICA	Japan International Cooperation Agency
KR	Khmer Rouge
LAN	Local Area Network
Mbps	Mega bytes per second
MOH	Ministry of Health
MHz	Mega (million) Hertz (cycles/second)
MPDF	Mekong Project Development Facility (IFC)
MPTC	Ministry of Post and Telecommunications of Cambodia
MRD	Ministry of Rural Development
NCDP	National Centre of Disabled Person

NIDA	National Information Communications Technology Development Agency (RGC)
NTCA	National Telephone Cooperative Association
NGO	Non-Government Organization
NPRD	National Programme to Rehabilitate and Develop Cambodia
PDK	Party of Democratic Kampuchea (Khmer Rouge)
RACHA	Reproductive and Child Alliance
RGC	Royal Government of Cambodia
SME	Small and Medium Enterprise
SO	Strategic Objective (USAID)
TAF	The Asian Foundation
TRIPS	Trade Related Intellectual Property System (WTO)
UCCDF	United Cambodia Community Development Foundation
UNCTAD	United Nations Commission on Trade and Development
UNICEF	United Nations Children's Fund
UNDP	United Nations Development Program
US	United States
USAID	U.S. Agency for International Development
USDA	U.S. Department of Agriculture
USDOC	U.S. Department of Commerce
USG	U.S. Government
VoIP	Voice over Internet Protocol
VVAF/VI	Vietnam Veterans of America Foundation or Veterans International
VSAT	Very Small Aperture Terminal
WB	World Bank
WCDO	World Concern Development Organization
WFP	World Food Program
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WTO	World Trade Organization
WVI	World Vision International

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I. Background

During the past several years USAID has increased its focus on leveraging Information and Communications Technologies (ICTs) within its development activities. ICT-focused initiatives undertaken by USAID have included the Leland Initiative, the Internet for Economic Development (IED) Initiative, AfricaLink, etc. In addition, a number of USAID Missions, with the support of their regional bureaus, are actively examining their country and development portfolios from an ICT perspective. Cambodia is such an example.

USAID's focus on placing increased attention on leveraging ICTs for international development was reinforced at the G-8 Summit that took place in July 2000 at Okinawa, Japan. While the Summit addressed several issues, the issue of the growing "digital divide" resulted in the development of the Okinawa Charter on Global Information Society. The Charter launched a Digital Opportunity Task Force (DOT Force) as a first step toward the goal of achieving digital access and education for all by the year 2010. A brief summary of the Charter and the global call to action is reflected as Appendix A.

In large part this increased global focus is predicated on the growing awareness of the impact that ICTs have had on the U.S. economy over this past decade. This impact has been captured and documented in a series of annual reports prepared by the U.S. Department of Commerce, most recently in its June 2000 report, "Digital Economy 2000." A brief summary of this report is reflected as Appendix B.

Asia and Near East ICT Program

This ICT Assessment for Cambodia has been undertaken in support of USAID's Asia and Near East (ANE) Bureau's Information and Communication Technology program. A copy of a two-page summary is reflected as Appendix C. As reflected in the Bureau's recent program description:

> *"Across Asia and the Near East region, Internet and E-Commerce is an emerging reality, but there are a number of key impediments to make it an everyday business practice. As the US Government recognizes the critical need for its partner countries to be engaged in the Internet and E-Commerce development, the ANE Bureau has adopted a 4 "P" approach to successful Internet Deployment: (1) Policy, (2) Pipes, (3) Private Sector, and (4) People."*

Each of these four "P" is future articulated in the Bureau's Information and Communication Technology program with the following:

1. *"**Policy**" – Opening doors through policy reform to permit the introduction and growth of information and communications technologies, reducing barriers to open connectivity, and ensuring that global electronic commerce can take place in an open and transparent fashion.*

2. *"**Pipes**" – Demonstrating the effectiveness of appropriate hardware and software by utilizing the latest technology such as wireless, high speed data transfer, secure transaction capability, extending the Internet to underserved areas, and working with private sector Internet Service Providers to offer a range of services to clients.*

3. *"**Private Sector**" – Ensuring the private sector "can do what it needs to do to be successful." This entails combining "Policy" reforms and "Pipes" improvement with ensuring there are sufficient, well trained technicians to support the build-out of ICT industries.*

4. *"**People**" – Implementing new approaches to sustainable social and economic development through Information and Communication Technology tools. It is critical to the success of the program that USAID's partners use the Internet and other ICTs as tools for development.*

The goal of this new ICT program is as follows:

> *"The goal of the Asia and Near East Information and Communications Technology program is to have all ANE Missions promoting one or more of the "4-Ps" within their development portfolio."*

ICT Assessment for Cambodia

This ICT Assessment has been undertaken in direct support of the ANE Bureau's ICT program and in direct consultation with USAID/Cambodia Mission personnel. The Assessment was carried out between 14-29 June 2001. While the primary focus was placed on USAID/Cambodia's portfolio, efforts were made to coordinate with the World Bank and the Government of Japan (GOJ), as both have ICT-related activities underway or planned for Cambodia.

In addition to relying on ANE's "4-P" framework, two other ICT-related assessment approaches have been taken into account:

1) a recently updated readiness assessment covering several countries issued by McConnell International[2]; and

2) a Readiness for the Networked World approach recently put forth by the Information Technology Group (ITG) at the Center for International Development at Harvard University[3].

Appendix D reflects additional information regarding both of these Readiness tools, including a preliminary assessment based on the ITG Readiness Guide.

This ICT Assessment has put forward two sets of recommendations. The first set of recommendations reflects broad publicly oriented recommendations that the ICT assessment

[2] http://www.mcconnellinternational.com

[3] http://www.readinessguide.org

team felt should be considered by the Royal Government of Cambodia (ROG) and/or donors, including USAID. These recommendations are incorporated within this assessment report. The second set of recommendations are reflected in a separate Appendix to the main Assessment report, and are oriented specifically toward the development portfolio of USAID/Cambodia. These have been put forward to the Mission staff in a preliminary form toward the conclusion of the ICT assessment for review and comments, with Mission input included in the final version of the assessment. It is anticipated that this discussion and dialog will continue—with the result being further detailing, designing, and implementation of those thought to best fit and contribute toward USAID/Cambodia program priorities.

II. Policies

A first critical component included in this ICT assessment consists of the RGC's position relative to ICTs. Specifically this focused on two key areas:

1) The RGC's policy and legal framework in the area of telecommunications, especially with respect to expanding the role of the private sector and ensuring a fair, open, competitive, and predictable marketplace; and
2) The RGC's policy and legal framework in the area of E-Commerce related specifically to issues that facilitate leveraging the Internet for conducting commercial and business transactions.

Summary/Analysis

In recent years the RGC has undertaken actions leading toward a more liberalized telecommunications environment. This got underway in 1996 with support from the United Nations Development Program (UNDP) and the International Telecommunications Union (ITU). This initiative provided support with respect to the organizational structure of the Ministry of Post and Telecommunications for Cambodia (MPTC) and in providing assistance for developing a national phone numbering plan. Subsequent support has been provided from Germany, via a KFW study, that recommended the separation of policy and operations within the MPTC. While delayed, this overall direction is the path upon which the MPTC is proceeding even now.

Findings: Policy

- **Considerable ambiguity and uncertainty in telecom policy environment at this time**
- **Draft Telecom Law under review**
- **World Bank providing Policy and Regulatory TA**
- **Ministry of Post and Telecommunications (MPTC) moving toward separating policy from operations (no Independent Regulator at this time)**
- **Voice over Internet illegal but not currently being enforced (though talk of this is taking place)**
- **Draft E-Commerce Law under review—primarily addressing digital signature and security-related issues**
- **Increasing focus on e-commerce by Ministry of Commerce (MOC)**
- **E-ASEAN Initiative likely to provide direction on ICTs in Cambodia, including e-commerce**
- **Intellectual Property Rights (IPR) on the books but not enforced**
- **New National Information Communications Technology Development Authority (NIDA) formed and developing national ICT Master Strategy**
- **Internet DNS & licensing of ISPs restrictive and cumbersome**
- **Lack of standard Khmer fonts impeding local content development, but being addressed by NIDA**

More recently the World Bank (WB) has provided support in a number of key areas, including the drafting of a new Telecommunications Law. This work has been undertaken through support by David Butcher and Associates. The current draft dates back to 1999 with work continuing to present. The most current activities underway include continued support from the World Bank via a PPIAF grant

that will address some of the legal and institutional aspects of the reform, such as interconnection regulation and process, tariff regulation and rebalancing, and the application of competition law to the regulation of the sector. In addition, there will be assistance on network and accounting separation, which will increase the transparency of the accounts, and encourage competition. These measures are also expected to strengthen local regulatory capacity, enabling the MPTC to settle disputes among operators and face the challenges of a competitive-multi-operator environment.

Current plans by the MPTC are to move forward with the separation of policy and operations within the next 3-4 months, with the actual new Telecommunications Law likely to take 1-2 years to be completed and passed by the Assembly. Current delegations of authority allow the MPTC to move forward in this manner as legislation works its way through the Parliament.

Concurrent with moving forward with a new Telecommunications Law, the MPTC has been active in promoting the expansion of telecommunications via allowing the private sector to become increasingly engaged. This has primarily been via licensing of wireless mobile operators to enter the Cambodian market, but has also included fixed lines, fixed wireless, Internet Access Providers (IAPs), Internet Service Providers (ISPs), and International gateways. As reflected in more detail under "Pipes," the current policy environment does allow for heavy private sector engagement, however, there are a number of ambiguities and uncertainties within Cambodia's present telecommunications environment that simply need to be addressed. In many situations this ambiguity is brought about by the gulf between the law/decree and actual practice. For example, while the use of Voice Over the Internet is illegal, in fact it is a common practice within Cambodia with local cyber cafés even publicly advertising the availability of these services. Another situation exists whereby at present Telestra/Big Pond has been granted a monopoly license as an Internet Service Provider (ISP) through February 2002, when in fact the MPTC provides similar ISP services and has since 1997—launching its own service via CamNet one month prior to Big Pond launching their services. A new ISP recently launched their services (MobiTel/TeleSurf) as has Camintel, a fixed wireless operator, though neither are legally permitted to promote/advertise their services in Phnom Penh.

As early as 1998, Cambodia had in place an "Electronic Transaction Act (ETA) that was put into effect 10 July 1998. This law was aimed at facilitating e-commerce by eliminating barriers resulting from uncertainties over electronic signatures. It served to promote the development of the legal and business environment to support electronic transactions. Part IV of the ETA includes several sections that address key elements of electronic transactions. Section 11 addresses the formation and validity; Section 12 addresses the effectiveness between parties; Section 13 address arbitration of disputes; Section 14 addresses evidence for acknowledging receipt; and Section 15 addresses the time and place of dispatch and receipt of electronic transactions.

In recent weeks the MPTC has also made available via their public website, a draft E-Commerce Law addressing digital signature, certificates, and other security-related issues (http://www.mptc.gov.kh). There also appears to be some similar E-Commerce related activities being undertaken by the Ministry of Commerce. Another promising development has been the

establishment in August 2000 of a new National Information Communications Technology Development Authority (NIDA), headed by the Prime Minister. This Authority is currently developing an IT Master Strategy for Cambodia, and is scheduled to hold a public seminar to discuss the contents on September 11, 12, and 13, 2001. Ideally this will result in an agreed upon RGC strategic direction covering a wide-array of ICT related elements.

With respect to trade-related policy direction, including e-commerce, Cambodia's direction will almost certainly be shaped in part by the Association of Southeast Asian Nations (ASEAN) and their current e-ASEAN Initiative. This framework is far reaching, and has the potential of creating a more unified and normalized set of trade-related policies, strategies, and regulations for the 10 member countries (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam).[4] The e-ASEAN Task Force[5] has approved a number of pilot projects in the ICT arena, with Cambodia likely to benefit directly from such shared resource-based initiatives, and regional cooperation and collaboration.

Regarding Intellectual Property Rights (IPR), Cambodia is not a member of the World Trade Organization (WTO) and it's IRP falls short—primarily based on 1992 UNTAC Criminal Code. Cambodia is a member of the World Intellectual Property Organization (WIPO), becoming a member in 1995, and acceded to the Paris Convention in September of 1998. Cambodia has also indicated it plans to join the Bern and UPOV Conventions, and the Patented Cooperation Treaty. Work continues on developing IPR legislation, including drafting trademark, copyright, and patent laws with assistance from WIPO.[6]

Another issue, while perhaps short of "policy," is that of Cambodian Internet Domain registration. This is carried out by the MPTC, with minimal support staff. In fact, the Open Forum of Cambodia, an NGO, provides the technical support for name registration, while the MPTC retains all the revenue from this activity. Current practices are again, somewhat arbitrary and fees are substantially higher than normally observed in other countries.

One policy related issue is the lack of enforcement of a decree making Voice Over Internet Protocol (VoIP) illegal. The issue here has largely to do with loss of revenue by the MPTC telecommunications operations. While illegal, the practice is very widespread within Cambodia, with cyber cafés publicly advertising these services on their storefronts. During our assessment there was discussion underway within MPTC to move aggressively to stop this practice, however, experiences of other countries show this is very difficult. The approach under discussion is to have MPTC offer these services to the public at a lower price than current international circuit switched connections, and then move to eliminate other's use of similar technologies by stricter enforcement.

Yet another policy related issue that involves a technology solution is the need for a common font for the Khmer language. At present there are a variety of international efforts

[4] http://www.aseansec.org/

[5] http://www.e-aseantf.org

[6] Country Commercial Guide, Cambodia 2000. U.S. Embassy (Prepared by the Economic/Commercial Section of the U.S. Embassy in Phnom Penh, Cambodia. Pages 27-29).

underway, and a number of technical solutions in place. This is an arena in which it appears the RGC is just becoming actively engaged, whereas in the past these standardization efforts have been undertaken by non-Cambodians. There are several individuals within Cambodia engaged independently in this arena, and in discussions with NIDA this topic is on a priority list for resolution.

Donor-related activities that are currently engaged in the area of Policy and will have an impact on Cambodia's strategic and policy direction, in addition to ASEAN (including ASEAN+3, the three being China, Japan, and South Korea, include: a) the World Bank who is currently providing TA for telecommunications policy reform, and b) South Korea with a loan for e-government.

Policy – General Recommendations

There are a number of vitally important policy-oriented elements within Cambodia that simply need to be addressed as soon as possible. This is especially important when considering the importance of the "digital divide" of Cambodia compared to other countries, and within the country itself. A number of efforts in several areas are currently underway, however, many of these have been underway for some time. It is important, especially in the telecommunications arena, that these receive a heightened level of attention and priority, and that long-standing issues be resolved as quickly as possible. The current level of uncertainty should be resolved such that the private sector can move forward with a stable policy and regulatory framework as a foundation.

General Recommendations: Policy

- **Support the Development of the National IT Master Strategy**
- **Finalize and implement new Telecommunications Law and implement**
- **Separate Policy/Regulation from Operations within MPTC**
- **Loosen restrictions/practices regarding Internet**
- **Expand awareness, education, & skill-building for ICT-related topics in Cambodia (public and private sectors)**
- **Establish common UNICODE for Khmer language**

1. **Support development of the National IT Master Strategy**—As ICTs become increasingly important for supporting economic as well as a number of socially-critical services such as health, education, etc., it is important that Cambodia develop an overarching strategic and tactical plan. While the G-8 countries are focusing on the digital divide issue of developed/developing countries, it is also essential that the developing countries themselves establish locally oriented strategies and plans for action. While telecommunications is a big component of such a plan, the National IT Master Strategy will go well beyond this and encompass education, e-commerce/e-business, e-health, etc. The NIDA is currently working on this draft, with a public seminar currently scheduled to take place on September 11, 12, and 13. Ultimately this Master Strategy will set Cambodia's direction for key ICT-related elements, with the Prime Minister signing the Strategy. This presents an excellent opportunity for not only USAID, but also other multilateral and bilateral donor organizations to focus their support in the ICT arena.

2. **Finalize and implement new Telecommunications Law**—For several years now the RGC has been engaged in developing a new Telecommunications Law. With the growing importance of telecommunications and the increasing number of private-sector players engaged in Cambodia, it is essential that this process be completed and that the process for finalizing the Law and developing supporting regulations be open and transparent; that the result be a stable, fair, and predictable telecommunications environment. Key areas needing resolution include interconnection (including timely dispute resolution procedures), Universal Service/Access provisions, and a more open Internet environment in Cambodia. Efforts underway by the World Bank should proceed as quickly as feasible in bringing closure to setting the foundation, and adding requisite details with regard to implementing regulations and processes.

3. **Separate policy/regulation from operations within MPTC**—It is understood that part of the planned direction for restructuring telecommunications within Cambodia is to separate out the policy/regulatory functions from the operations activities within the MPTC. This should be carried out as quickly as possible so as to allow the operations to be "corporatized" with its own management. In carrying out this separation it is imperative that a level playing field be established such that there is no regulatory preference provided to the telecommunications and ISP services being provided by MPTC, and that administrative procedures be such that any conflicts that arise between MPTC's operations and those of other carriers and ISPs be resolved in an open and timely manner.

4. **Loosen restrictions/practices regarding Internet**—At present there appears to be a preference towards limiting the number of firms that can provide Internet-related services (specifically those thought of as ISPs). However, this restriction has not been consistent, nor have the processes been very open and transparent. Many of them are also unnecessary and result in retarding the growth of the Internet within Cambodia. While it is understandable to restrict the number of licenses for providing telecommunications services, there is no strong rationale for restricting ISPs within Cambodia. The free market should dictate private sector engagement in this arena based on the customer demand and the quality of services being provided. Pricing for registering domains should be lowered (they are very high compared to international pricing) and the procedures should be streamlined. Restrictions on services (e.g., who can provide Web hosting for example) should simply be abolished.

5. **Expand awareness, education, & skill building for ICT-related topics in Cambodia (public and private sectors)—**The introduction of Internet-related services within Cambodia is relatively recent, with E-mail being the most dominant use at present. In part this is due to the above-referenced artificial restrictions, but also it is due to limited access and high cost. With the importance of the ICTs, specifically telecommunications and the Internet growing in virtually all sectors, there is the need to undertake an aggressive program of awareness, education, and skill building across the board. Clearly there is the need for a strong focus on policy and regulatory related awareness and training for the public sector. But with the strong engagement of the private sector, there is also the need to have a shared level of understanding between the public and private sectors. A comprehensive

awareness, education, and targeted skill-building initiative would rapidly advance the incorporation of ICTs into Cambodia's public and private sectors.

6. **Establish common UNICODE for Khmer language**—One of the key restrictions that limited the use of ICTs, specifically the Internet in Cambodia is the lack of an international standard for the Khmer language. At present there are various solutions to this issue, but unless the individual sender/receiver, or provider/user agree on using a common solution (out of several alternatives available in the marketplace), it is impossible to communicate in the Khmer language. This simply needs to be solved, and solved at the national level. As it is now, other parties, outside of Cambodia are pressing for resolution of this issue, and until just recently, with little direct engagement from the RGC itself. Recent engagements with a Japan initiative by the Open Forum of Cambodia hold much promise, but this needs national support to resolve and bring to a conclusion as quickly as possible. In recent months there has been RGC engagement in this arena via the Minister of Commerce in association with the eASEAN initiative and the NIDA efforts. This puts the issue at the highest level of the government and should result in resolving this issue in the not-too-distant future.

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III. Pipes

One of the underlying components increasingly recognized as critical to development is the telecommunications infrastructure. In recent years this has become even more critical as globalization expands and increasingly relies on ICTs as a fundamental component of this global expansion (e.g., e-commerce, e-business, and e-government).

This section of the ICT assessment examines the in-country telecommunications environment from several perspectives and levels, including such topics as: a brief overview of the telecommunications environment in Cambodia, public telephone access, mobile wireless, Internet services, international connectivity, personal computers, and observations from International Telecommunications Union (ITU) statistical data

Summary/Analysis

The telecommunications situation in Cambodia can be described by four dominant themes: 1) very low telecommunications access—especially in rural areas, 2) a MPTC providing both telecommunications direction setting, land line telecommunications, and ISP operations; 3) a rapidly expanding wireless mobile telephony market dominated by MobiTel with approximately 80 percent of the mobile market and rapidly expanding its network and services, including wireless Internet and ISP, but with other niche fixed wireless players; and 4) high costs for telephony and Internet due in large part to the continued reliance on satellite/VSAT for international connectivity (current fiber is of limited use due to its high failure rate).

Findings: Pipes

- **MPTC provides telecommunications and Internet services, competing with the private sector**
- **Several private sector telephony companies in place with market dominated by MobiTel with 80 plus % of the market**
- **National teledensity (number of lines per 100 population) of land-lines was placed at 0.25 by ITU (1999), one of the lowest in the region**
- **High growth rates in recent years in cellular mobile—teledensity placed at a 0.81 by the ITU (1999)**
- **Total teledensity currently estimated at 2.28 with mobile phones potentially as high as 90% of total in Cambodia**
- **Estimated total number of phones in Cambodia placed at less than 250,000-300,000**
- **Low availability of public phones (1 percent by ITU for 1999) is low and does not to compensate for low teledensity**
- **Estimated total number of Internet accounts is placed at approximately 7,000(representing approximately 30,000 total users; estimated number of PCs is placed at 15,000**
- **Estimated 50-80 public "Cyber-Cafés" in Cambodia providing public access to the Internet**
- **Significant urban and rural "digital divide"**
- **Domestic pricing for telephony and Internet is highest in region (due in part by high % reliance on mobile)**
- **International access is dominated by reliance on costly satellite/VSAT connectivity, also high cost**

The ITU's most recent report (Asia-Pacific) places the population of Cambodia at 10.95 million in 1999, and the

number of number of main telephone lines (fixed lines) in Cambodia at 27,700 for a teledensity (main lines per 100 population) of 0.25. This is by far one of the lowest teledensities in the Asia-Pacific region; for that matter, in the world. The average for the lower-income countries is 5.33. Developed countries teledensity average is 55.10. When one thinks of a "digital divide," Cambodia surfaces as a poster country in the region.

Paradoxically, Cambodia also stands out as having possibly the highest penetration of cellular phones relative to fixed lines anywhere in the world, although this may simply represent a rational response to market failure. The same ITU report places the wireless mobile teledensity of 0.81 and the actual number of mobile wireless phones in Cambodia in 1999 at 89,100. This reflects that 76.3 percent of the phones in Cambodia during 1999 were mobile wireless. The average for lower-income countries is 25.1 percent; developed countries average is 43.8 percent. This percentage has only grown since 1999 as the current estimate of mobile wireless is placed at between 120,000-150,000, and this does not take into account the fixed-wireless. Installation of main lines (land-lines) has proceeded at a relatively slow pace and continues at a very high cost by comparison.

In spite of this rapid growth in the mobile cellular market, the fact remains that Cambodia remains a very unconnected country. This is especially the situation in rural Cambodia, where 85 percent of the population lives. The ITU Asia-Pacific report reflects that the teledensity in the largest city in Cambodia (Phnom Penh) has nearly 60 percent of the main lines, whereas it has only 9.5 percent of Cambodia's population. While fixed wireless and mobile cellular have been more active in non-urban areas, and as a result has mitigated this disparity to some degree, the "digital divide" within Cambodia, raises its head.

Regarding Internet, the local market in Cambodia is primarily constrained by access speeds and pricing. Interestingly, while the growth in mobile cellular is very significant, it doesn't do much to help access to the Internet, except at very low speeds and very high costs. The limited number of main lines and the costs primarily restrict Internet use to e-mail and urban areas. Wireless access to the Internet has recently been introduced by MobiTel/TeleSurf, with expansion already starting to take place outside of Phnom Penh.

In addition to limited physical access being an issue with regard to the use of telecommunications, limited use due to pricing is yet another significant issue. Pricing in Cambodia is one of the highest in the Asia-Pacific region. Interestingly, the use of public phones has not taken hold in Cambodia to offset these limitations but this is likely due to the high mobile phone density. The percent of public phones to main lines is only 1.09 percent in Cambodia; average for lower-income countries is over twice this number at 2.61 percent (1999 ITU data). With regard to pricing, Cambodia is simply off the map compared to other countries, most likely correlating with its much higher reliance on mobile cellular and it's high costs for satellite-based international connectivity. Telephone subscription pricing as a percent of GDP per capita is 74.7 percent based on 1998 data! By comparison, the average for lower-income countries is 9.2 percent. This makes the cost for telephony access in Cambodia perhaps the highest of any country in the world. Again, it is an issue relative to the "digital divide" and naturally carries forward in terms of high costs for Internet access as well.

Several articles have been written on Cambodia in recent years, one providing a current view of activities in Cambodia appeared in the November 1999 issue of Wired magazine.[7] More recent series of ICT-related articles for the region appeared in the AsiaWeek publication dated June 29, 2001.[8]

Wireless Telephony

Wireless mobile telephony dominates the telecommunications sector in Cambodia with likely well over 80 percent of the country's telephony provided by wireless technologies. There are several players currently engaged in this sector, including the following:

- **Camintel**—Camintel is a fixed wireless operator with services being provided in approximately 25 cities. Interconnection is via a number of means including microwave and fiber, but the dominant interconnection is provided via satellite. The firm is 51 percent owned by the RGC and 49 percent owned by IndoSat. Camintel has approximately 5,500 subscribers.
- **MobiTel**—MobiTel is by far the dominant wireless operator in Cambodia with an estimated 80 percent of the market. Interconnection within its system is provided via some fiber, but mostly via interconnecting their cellular towers via microwave. MobiTel is a joint venture between a Cambodian company called Royal Group (38.5 percent) and Milicom Group (61.5 percent) of Luxembourg. It is thought to have approximately 100,000-120,000 subscribers in 15 provinces.
- **Camtel**—Camtel was the original provider of wireless telephony in Cambodia and still relies on analog technology for its connectivity. While it may well upgrade to digital, recent data shows it is losing significant market share, with an estimated customer base of approximately 1,500. Camtel is owned by the Charoen Pokphand Group of Thailand.
- **CASACOM**—CASACOM Thai-Malaysian is a joint venture with 51 percent owned by Telekom Malaysia and 49 percent owned by SAMART of Thailand. It has an estimated customer base of 28,000-48,000 subscribers and relies on GSM technologies.
- **Camshin**—Camshin is a subsidiary owned 100 percent by Shinawatra from Thailand with an estimated customer base of less than 30,000 customers, though some estimates place it as high as 37,000. Camshin relies on Shin satellite for its domestic interconnection.

Internet Services

- **E-Mail Services**—The dominant e-mail only service provider in Cambodia is the Open Forum of Cambodia. They provide e-mail, including listserv to approximately 800

[7] http://www.wired.com/wired/archive/7.11/cambodia.html

[8] http://64.4.8.250/cgi-bin/linkrd?_lang=EN&lah=cef275ff0871418d36e049a0ffd47e10&lat=993704476&hm__action=http%3a%2f%2fwww%2easiaweek%2ecom%2fasiaweek%2ftechnology%2farticle%2f0%2c8707%2c132691%2c00%2ehtml

subscribers at a cost of US$ 8.00 per month. While virtually all subscribers rely on dialup landline services, the Open Forum does provide e-mail via mobile cellular as well. The Open Forum is a major tool for NGOs/PVOs operating in Cambodia in that it provides low cost, high quality service—even though it is restricted only to e-mail. Interestingly, the Open Forum was the first to introduce e-mail into Cambodia in 1994, was the original domain registration for Cambodia, has worked closely throughout with the MPTC, and even today provides the technical support for the MPTC domain registration. Yet, the MPTC restricts it to providing e-mail only, and not broader web-based services.

- **Internet Service Providers**—The situation in Cambodia is a bit confused with regard to who provides ISP services. The Internet was introduced into Cambodia via support from the IDRC of Canada in May of 1997 through CamNet. In June of 1997, just a month later, Big Pond went online, and in theory, has a monopoly license until February 2002. However, in the interim other firms provide ISP services including MobiTel/TeleSurf, and Camintel. Yet at the same time, firms such as KIDS and Open Forum, appear to play by the rules and are not allowed to provide expanded services typically thought of as those provided by an ISP.

  Costs for Internet access within Cambodia are perhaps some of the highest in the world. Part of this is due to the cost of satellite-based access, but that certainly cannot account for the entire cost structure. The following provides sample cost structures for two leading ISPs.

  - **Telstra/Big Pond** Internet services have a start up fee of US$ 30, require a deposit of anywhere between US$ 50 and US$ 500, and have a monthly fee of US$ 20 for 3 hours of use/month, or US$ 110 for 35 hours of use/month. Depending on the plan chosen, additional use is between US$ 1.90 and US$ 3.50 per hour. Domain Naming Services (DNS) are US$ 100 per year.
  - **MobiTel/TeleSurf** broadband (delivered over wireless technologies) have an installation fee of between US$ 40 for 64Kbps service to US$ 250 for 1Mbps service. Monthly fees run between US$ 30 for 64Kbps, US$ 150 for 128Kbps and on up to US$ 3,000 for 1Mbps service. In addition to the monthly fees, MobiTel/TeleSurf charges for data transfer over the network (e.g., it is a metered service) at US$ 20 per month for 100MB, US$ 50 per month for 300MB, and up to US$ 100 for 1GB.

- **Cyber Cafés/Community Information Centers**—A growth industry, especially in Phnom Penh, has been the establishment of cyber cafés. It is estimated that there are somewhere between 30 and 50 in Phnom Penh alone, and anywhere between 50 and 80 Cambodia-wide. These cyber cafés provide walk-in access to the Internet for those who cannot afford an Internet connection at home or business, or who simply don't have enough demand to warrant such a cost. The current going rate throughout Phnom Penh is in the order of US$ 2/hour of use, but as one can imagine, the actual speed of the connection varies considerably even though the price may be fairly constant. In addition

to providing Internet access, many of the cyber cafés also provide additional services such as e-mail, website development, and training.

As would be expected, most all of these cyber cafés are located in urban areas. Seldom do such facilities exist in rural settings where there may be needed, but where there are lower income levels and perhaps no connectivity (or even electricity). Various community-based models for providing such services in these more marginal areas exist, and increasingly are being supported though international development activities—especially those with a focus on narrowing the "digital divide." Ideas for such efforts are reflected in a recent study undertaken by the National Telephone Cooperative Association (NTCA).[9]

Remote Telephony and Internet Access

MPTC has some minimal landlines outside of Phnom Penh proper, however, by and large, remote telephony is being provided via mobile cellular providers such as MobiTel or via fixed wireless provisioning by Camintel. Both provide in-country long distance via a combination of fiber, microwave, and satellite. Satellite is the dominant use by Camintel, due in part to the fact that 49 percent of its ownership is by IndoSat (a satellite company providing regional services).

With regard to Internet access beyond Phnom Penh, for the most part this is either low-speed Internet supporting only e-mail. Some limited access is available via wireless. In recent months, however, MobiTel/TeleSurf has started to extend higher-speed Internet services into selected provincial cities via its Internet wireless solutions. This is expected to grow significantly in the future as they add Internet services on top of their mobile wireless infrastructure (e.g., towers and interconnecting microwave).

International Connectivity

At present international connectivity is provided almost exclusively via satellite communications, though there is some fiber between Cambodia and Thailand and Viet Nam. The international connectivity is provided via two providers, Telstra/Big Pond and more recently, MobiTel/TeleSurf. Current plans by the MPTC appear to be oriented toward maintaining this duopoly. Both rely heavily on satellite as the current fiber infrastructure between Thailand, Cambodia and Viet Nam is unreliable. This is due in part to poor initial installation of the fiber, which buried the fiber shallow with as many as 15-17 cuts/week taking place, forcing continued reliance on the more expensive satellite solutions. The Asia Development Bank (ADB) is undertaking a study to establish a fiber ring in the region, connecting Cambodia, Viet Nam, Thailand, and Lao P.R.D.. However, the study will likely take a year and any resulting solutions an additional 3-4 years.

[9] **Role of the Private Sector in Sustainability of Community Information Centers**. National Telephone Cooperative Association. June 2000

ITU Telecommunications Information

In December 2000, the ITU published an Asia-Pacific Telecommunication Indicators 2000 report[10] with updated 1999 connectivity data. This report stated Cambodia's 1999 population at 10.95 million. These were mid-year estimates from the United Nations (UN). The ITU report also states Cambodia's Gross Domestic Product (GDP) for 1998 as US$ 2.1 billion, with a calculated per capita GDP of US$ 196 for 1998. ITU's source for this information is from the International Monetary Fund (IMF) and the Organization for Economic Co-operation and Development (OECD). This places Cambodia into what is considered a "lower-income" country; lower-income being defined as those countries with a Gross National Product (GNP) per capita of US$ 290 in 1999. To ensure consistency and normalization for comparisons within the ITU report, these population and GDP numbers are used for purposes of the following.

A series of tables with data extracted from the December 2000 ITU Asia-Pacific report is reflected in Appendix F. For this analysis, Cambodia's data was compared to the statistical data from the neighboring countries of Lao P.D.R., Thailand, and Viet Nam. In addition, Cambodia's data was compared to the averages for other lower-income, upper-income, and developed countries in the Asia-Pacific region (including an Asia-Pacific regional average). A number of key comparisons have been included in the above summary. For detailed data and more detailed analysis of this data, refer to Appendix F.

Donor Activities

At this time only the ADB is providing direct assistance to Cambodia in the area of improving connectivity. Two efforts are underway: a) re-laying fiber on the road between Sihanoukville and Phnom Penh, and b) a feasibility study for establishing a fiber-ring between Cambodia, Laos, Viet Nam, and Thailand. This latter activity is just getting underway with completion of the study likely to be a year away.

Pipes – General Recommendations

General Recommendations: Pipes

- **Develop a Rural Telecommunications Access Plan**
- **Privatize MPTC's Telecommunications and ISP operations**
- **Expand awareness, education, & skill-building for ICT-related topics in Cambodia (public and private sectors)**
- **Expand fiber for in-country and international communications**
- **License 2.5G and 3G wireless**

The telecommunications environment within Cambodia is becoming increasingly driven by the private sector, as they seek to expand their markets. This is especially the situation in the wireless mobile arena where growth has been quite remarkable in recent years. While this expansion includes movement into areas outside of Phnom Penh, it is being driven by economics/profit potential. Without some intervention by the RGC, the result will be an expanding "digital divide" within Cambodia as the large rural populations are overlooked in preference to the urban areas. Public policy is needed to encourage the build-out of telecommunications in rural areas, and typically this is

[10] **Asia-Pacific Telecommunication Indicators 2000**. ITU. Geneva, Switzerland. 3 December 2000.

accomplished via Universal Service/Access Obligations being placed on the part of the telecommunications operators. However, other measures are also needed in order to expand access to telephony and the Internet throughout Cambodia.

7. **Develop a Rural Telecommunications Access Plan**—It was recommended under Policy that country of Cambodia develop a broadly based National ICT Strategic and Tactical Plan. This would encompass not only telecommunications but other ICT-related topics. It would most likely also incorporate a special focus on rural connectivity in an effort to address the "digital divide" issue. At present the issue of rural connectivity is primarily left up to the private-sector firms engaged in building out infrastructure. And even though the RGC owns 51 percent of Camintel, which has focused attention in areas outside of Phnom Penh, more attention is needed to building out telecommunications in rural areas. Ideally a comprehensive telecommunications law would also address the issues of Universal Service/Access in the rural underserved areas. However, it is recommended that to kick start a focus on providing rural access, that the RGC along with the private sector telecommunication providers come together and develop a shared approach to reaching the rural communities within Cambodia. This should be incorporated into the larger National IT Master Strategy, however in an effort to move fast, it is recommended a focused initiative by those engaged in providing infrastructure, be undertaken as an interim measure.
8. **Privatize MPTC's telecommunications and ISP operations**—At present the MPTC operations provide the bulk of the landlines within Cambodia. The other licensed carriers are focusing on the cellular market, predominantly the mobile cellular license. It is recommended that as soon as possible, that not only the MPTC telecommunications and ISP operations (e.g., CamNet) be separated from the policy/regulatory activities, but that ultimately these be completely privatized. It is feared that as long as they remain within the MPTC they will not have sufficient funds or financing to expand their reach and enhance their services—both being much needed. With regard to the ISP, this should be a very simple undertaking, with the potential that if CamNet isn't sold off reasonably quick, it may simple cease to be a viable entity given current market pressures. The long-term operations of a government-owned telecommunications carrier in a market that is otherwise being supplied by the private sector simply creates a situation that of no value to the RGC or the country.
9. **Expand awareness, education, and skill-building for ICT-related topics in Cambodia (public and private sectors)—**As reflected in the Policy recommendations, this is a critical component to growing and maturing the provisioning and expanded use of ICTs across Cambodia. This awareness, education, and skill building should extend to both the public and private sectors.
10. **Expand fiber for in-country and international communications**—While there is currently limited access to fiber within Cambodia, and between Cambodia, Thailand and Viet Nam, this current infrastructure is very limited with regard to coverage and performance. As a result, firms providing connectivity are required to invest in their own fiber or build microwave links. For international communications there is near

total dependency on satellite communications. This is perhaps the most costly form of international communications available and lacks capacity to support anticipated growth. At present the ADB is engaged in two activities associated with fiber—one being the reburying of an existing fiber within country, and the other is a feasibility study for a joint fiber project linking Laos, Thailand, Cambodia, and Viet Nam. This study is just getting underway, with the ADB providing US$ 1.8 million for the initiative. With the study likely to take at least a year, any remedy coming out of this will be several years away. Any joint RGC and private sector efforts to speedup the establishment of critical fiber infrastructure to expand in-country as well as international connectivity should be examined.

11. **License 2.5G and 3G Wireless**—At present the bulk of the licensing for mobile cellular is in the 800 MHz and 1.8 GHz frequency range. While this licensing has allowed for very rapid growth of mobile cellular services, the technologies relying on these frequencies have minimal data carrying capacities. To an extent this is being addressed by MobiTel/TeleSurf in their recent introduction of wireless Internet relying on 3.5 GHz frequencies. Another alternative underway in a growing number of countries is to expand wireless licensing to what is referred to as 2.5 generation (or General Packet Radio System-GPRS) and even 3rd generation technologies with substantially higher data-carrying capabilities. Such an action on the part of the RGC would enable current and possibly new-entrants to expand their wireless provisioning in such a way as to concurrently enable greater Internet access (through pricing could limit its potential). Other options to consider are licensing MMDS and LDMS frequencies.

IV. Private Sector

It is the private sector that must generate the business activity that establishes and maintains economic growth and improves the living standards of the citizens. This third area within the ICT assessment framework focuses on two key areas relative to leveraging ICTs in Cambodia:

1) determining the strength and potential of the ICT-related sector itself relative to supporting the domestic and international markets,
2) and the reliance on ICTs by local non-ICT businesses in an effort to improve the effectiveness and efficiencies of their operations and where appropriate, to potentially become more competitive in the global marketplace.

Summary/Analysis

GNP – Composition by Sector	
• Agriculture	39.6 percent
• Services	41.6 percent
• Industry	18.8 percent

The Gross National Product (GNP) of Cambodia is placed at US$ 3.1 billion for 1999. The private sector within Cambodia to a significant degree is largely agriculturally based, accounting for 39.6 percent of the country's GDP, and approximately 75 percent of the national employment (1999 data). Industry accounted for 18.8 percent of the economy and Service accounted for 41.6 percent. Regarding employment, agriculture employs 76.5 percent, services 17.1 percent, and Industry 6.4 percent (based on employed population – aged 10 and above and using 1999 figures). With this composition of the country's economy, the role of and use of ICTs are relatively limited.

Findings: Private Sector

- **There are several private sector telecommunications firms engaged in Cambodia, along with the MPTC**
- **There is not what may be considered an ICT sector in Cambodia beyond SMEs supporting the increased use of ICTs by the business community itself (PCs, LANs, MISs, etc.)**
- **There are some uses of B2C starting to take place within Cambodia, primarily in the tourism-related activities and some local products**
- **Local universities are providing ICT-trained graduates, but frequently without adequate hands–on experience on newer tools/products and networking hardware/software**
- **Universities have limited or no Internet access for faculty and students**
- **There are a few international colleges and universities starting to deliver ICT programs that have internationally-recognized certifications and degrees**
- **Most use of Internet in Cambodia by SMEs is limited to E-mail**
- **Locallv-issued credit cards have been**

Within this context, the ICT businesses can perhaps best be described simply as embryonic. There are a few Small and Medium Enterprises (SMEs) beginning to emerge that provide ICT-related sales and services to large as well as SMEs who are increasingly adopting ICT within their operations. This is typically in the form of personal computers (PCs), some Local Area Networks (LANs) and in some cases, Management Information Systems (MISs), though it appears this is quite small. Internet is just now coming online with

respect to being viewed as a business tool. This is largely due to high costs and a general lack of awareness as to the potential value of having an Internet connection and doing business online.

By far the most intensive ICT-related businesses are the various private sector telecommunications firms as reflected earlier in the Pipes discussion (including telecommunications companies, ISPs, cyber cafés, etc.). A few early-adopting firms are beginning to go beyond the use of Internet e-mail, and are starting to use the Internet to sell products/services. This seems to be taking place at an expanding rate in the tourism sector (Services) where the Internet is a valuable tool used by consumers for booking travel, hotel reservations, etc.

It is increasingly becoming understood that e-commerce/e-business holds potential for developed and developing countries alike. Primarily this is due to the characteristic of lowering friction in carrying out economic transactions (e.g., either reaching more customers for less cost or simply lowering transaction costs). However, it is essential that a realistic understanding of this potential be grasped before launching any expansive e-business initiatives. First, in the U.S., where e-business is more advanced than most any other country, e-business transactions account for only approximately 1 percent of total commerce. Of this, approximately 80 percent is B2B and 20 percent B2C. This would indicate there's a lot more "hype" than substance when it comes to this arena. And even with these numbers, no one is making the case that e-business is new or additive, but most likely is simply an alternative form of carrying out economic transactions.

Key factors in the local/national success of e-commerce are: a) the purchasing power of the target customer base, b) the availability/use of credit by the target customer base, and c) the level of access to the Internet for carrying out these electronic transactions. When these three critical success factors are examined even at a cursory level within Cambodia, it is clear that e-commerce/e-business is not going to be a big domestic phenomenon with Cambodia any time soon.

However, that is not to say there are not e-commerce opportunities for pursuit within Cambodia, but rather any approach undertaken must be clearly targeted. The following are potential target opportunities. First, the Cambodian diaspora outside of Cambodia country has a built-in focus/orientation toward Cambodia and likely greater purchasing power and access to the Internet (at least in many countries). A possible way to reach this diaspora is in selling over the Internet local goods and services for delivery within the country. Several countries have private sector-led initiatives whereby a virtual mall is established for the sole purpose of selling to an overseas market, sometimes targeted to deliver to relatives and friends living in-country (Armenia, Sri Lanka, Morocco, Ethiopia, Eritrea, etc.). An example of a successful cyber mall is PEOPLink, a non-profit organization helping artisans from developing countries market their products directly to buyers on the Internet. The site received 14,000 hits and $30,000 in sales by the end of 1998 with sales ranging from US$50 - 500 per day and up to 90% of the sale going to the artisan(s).[11]

[11]UNCTAD, Creating a Development Dynamic. http://www.opt-init.org/framework/pages/appendix2.html

A second area with promising potential is tourism. Tourism represents one of the largest sectors of e-commerce over the Internet - reaching those with greater purchasing power. Revenues for Internet-based travel agencies are expected to rise from $5bn in 1999 to $30bn in 2001.[12] Cambodia with its rich history and cultural monuments could easily benefit from this boom.

Another possibility with promise is Business-to-Business (B2B) as this is where the bulk of transactions take place and local connectivity limitations can be more readily overcome (e.g., via dedicated lines between businesses such as garment factors, exporters, transcription /data entry services, etc.). An example of how B2B can improve transactional efficiencies is a new utilities exchange in Africa, called utilitiesafrique.com. It supports e-trading between African utilities in power, water, gas and telecommunications and their suppliers. The portal is expected to decrease sales costs by 80% and processing costs by at least 50%.[13] Within in the context of Cambodia where agriculture is a dominant proportion of the country's GNP, it is perhaps also relevant to mention the possibility of rural trading networks. In this instance producer-supplier linkages are strengthened and made more efficient through the Internet. Chineros, a small rural village in Peru, set up an Internet-based partnership with a national export company to sell its produce in overseas markets. The village income is now in five-times its prior income to US$1,500 per month.[14]

The local universities have added computer-related courses to their curriculum, and in several cases have developed and offer computer science degrees. It appears those graduating from these programs are reasonably successful in finding ICT-related employment within Cambodia either in those firms specializing in providing ICT-related services or directly with companies that are making use of ICTs within their business activities. In addition to full degree programs, there is a growing demand for non-degreed ICT-related training and this demand is being met by various private sector firms that frequently provide English language training as well as a wide variety of computer-related training.

One area where there is a lack of local ICT-related support is in the various certification programs. Most vendors provide and support certification programs whereby there are standard, objective testing of computer specialists to ensure high quality in the workforce. Firm such as Microsoft, CISCO, Sun Microsystems, Oracle, as well as others support such programs. No such independent certifying authorities are operating in Cambodia, with students and technical staff needed to go either to Singapore or Bangkok in order to obtain such certification. Reluctance to entry are likely due to high costs and the issue of software piracy which is prevalent in Cambodia.

Another issue emerging in the private sector relates to the availability of higher-priced software in the country, and even software than can be purchased from Cambodia. It appears

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[12] Economist Intellegience Unit. Best Practice. December 5, 2000. http://www.ebusinessforum.com/index.asp?layout=rich_story&channelid=3&categoryid=8&title=Ctrip%2Ecom%3A+Internet%2Dbased+travel+service+thrives&doc_id=1697

[13] http://www.opt-init.org/framework/pages/appendix2.html

[14] ibid.

that the level of software piracy in Cambodia is such that some companies (Microsoft noted as one), will not sell software into Cambodia from Bangkok as they fear it will be copied and resold or provided free of charge. This relates back to the issue of Intellectual Property Rights (IPR) covered under the Policy discussion.

One of the important donor organizations active in promoting SMEs in Cambodia, and with at least a focus on ICTs is the Mekong Project Development Facility (MPDF). The MPDF is sponsored by the World Bank Group through the IFC and has been instrumental in providing support in several key areas including activities with an ICT flavor. These include support for a Cambodian-based rice millers association in setting up PCs and LANs, and moving them forward in providing key information via the Internet to their members. The other is in providing valuable Internet-related training to sector specific groups, such as small travel and tourism-related businesses, with impressive results.

Private Sector – General Recommendations

General Recommendations: Private Sector

- **Undertake a series of awareness-building and educational seminars for local SMEs**
- **Enhance Internet connectivity at Cambodian universities**
- **Establish in-country ICT certification programs**
- **Support increased use of the Internet to support Cambodian SMEs engaged in tourism**

Ultimately it is the private sector within Cambodia that must become the engine for economic growth. And as part of this growth there is the potential leveraging of ICTs to improve their internal operations and possibly expand their markets. At present ICTs are showing up in increasing number of large and SMEs, but for the most part it remains at a very early stage of ICT adoption. Potential initiatives here are aimed at increasing the awareness of business managers and increasing the skill-sets of the technologists within Cambodia. Clearly with the dominance of agriculture and tourism-related services, these should be two key areas of focus. In addition, while there are a number of local universities with computer science programs, Internet access remains very restrictive, with professors and students have having inadequate access to these valuable resources.

12. **Undertake a series of awareness-building and educational seminars to local SMEs**—With the Internet just beginning to become available on a broad basis within Cambodia, there is an opportunity to accelerate its adoption by establishing a series of awareness and educational seminars for the private sector. Similar awareness, educational, and technical support is needed for public and private sector participants focusing on the policy/regulatory and infrastructure topics. Here the focus is on the application of the technologies and how to adopt ICTs and the Internet into private sector business related activities. Topics such as e-commerce and e-business provide the orientation for local business managers to gain the advantage of the early adopters in other countries—avoiding the wasteful pitfalls experienced by many. Providers of such seminars should be drawn from a wide-range of sources in an effort to provide as broad of input and experience base as possible. Focus is also needed on creating a solid understanding of just what is required to be successful, and realistic expectations to be achieved in entering into the use of more sophisticated ICTs.

13. **Establish Internet connectivity at Cambodian universities**—At present even universities with degree programs in computer science have no or very limited access to the Internet to support research by their professors, let alone by their students. While costly by local standards, and certainly above the normal international rates, in fact this is not outside the reach of many donor organizations. Yet it currently is a critical missing component to developing the workforce of Cambodia's future—be it the office worker, the manager, or the technical support staff. Ultimately each local university will need to be examined with regard to establishing high-payoff targets, and on implementing access in such as manner as to ensure the investment is directed toward these targeted area. Ideally agreements can be established for bulk access, possibly even via a shared international link, whereby the universities pool their resources and establish a university network for gaining access to the Internet. It is anticipated that in some situations, this access must also be supported with additional technical staff at the universities (part of the requirement satisfied by students themselves). In addition, it is likely that in some situations there will be the need to provide updated/current personal computers and Local Area Networks for consolidating access to the Internet.

14. **Establish in-country ICT certification programs**—With the growing reliance on ICTs within Cambodia, there is the need for increased focus on developing a strong technical skill base. A number of universities are providing degreed technical training programs, as are a growing number of local SMEs. The latter not only provide targeted skill development, but also frequently are themselves firms delivering technical support to the growing use of PCs, LANs, office software and even MISs and databases within large and SMEs. However at present there are no internationally recognized certification programs in Cambodia where students or technicians can acquire formal certification from firms such as Microsoft, CISCO, Oracle, etc. The establishment of such a facility within Cambodia is much needed and would be an important step in upgrading the knowledge/skills of the technical workforce. This seem especially absent in the area of skilled network technicians where there is no substitute for hands-on training and experience, and where a high level of technical competencies are essential.

15. **Support increased use of the Internet by Cambodian SMEs engaged in tourism**—One of the most rapidly growing sectors within Cambodia is tourism. Tourism is also a sector in which B2B and Business-to-Consumer (B2C) transactions are prevalent over the Internet. While clearly the international businesses make use of the Internet, typically the small independent hoteliers or guesthouses, local guides, etc., do not have such awareness and opportunity. The MPDF has in recent months undertaken an awareness/training activity in this sector with very encouraging results from those becoming engaged in this arena. This recommendation is aimed at taking this one step further by not only expanding this awareness and training, but by supporting the establishment of a consolidated Website and services aimed primarily at supporting the small local independent tour operators, hotels, guides, etc., such that they can expand their markets to reach overseas more effectively and efficiently. This proposal may also best be linked with the establishment or strengthening of a local small operator tourism association, with this being one of the key services being

provided to its members. Another potential option is to link with regional initiatives such as a planned e-ASEAN pilot for e-tourism.

V. People

The three prior sections address pipes, policy and the private sector. This section focuses on the people. Specifically, this section analyzes and makes recommendations on utilization of ICT technologies: a) internally at USAID/Cambodia; b) generally across Cambodian society; and c) within USAID programs across all Strategic Objectives. To some extent, this section also serves to integrate the findings and analyses of the policies, pipes, and private sector sections with USAID's current development portfolio such that there is a foundation laid with respect to putting forth a series of ICT-related recommendations

Summary/Analysis

ICTs, especially the Internet, hold the potential for being leveraged to contribute significantly across virtually all USAID programs, be it HIV/AIDS, Democracy and Governance, Education, Economic Growth, Agriculture, etc. The ANE Bureau's program to support ICT-related activities in the Missions recognizes this potential, and is the backdrop for this ICT Assessment.

Findings: People

- **Considerable use of Internet e-mail by NGOs residing in Phnom Penh, but there is a lack of Internet connectivity outside of Phnom Penh, though this is improving somewhat**
- **No USAID focal point for program use of ICT**
- **Open Forum of Cambodia provides critical and low cost e-mail/networking for NGO community in Cambodia**
- **Some NGOs starting to build Internet websites and even marketing products to improve sustainability**
- **Some cyber cafés opening outside of Phnom Penh, but opportunity to support Community Access Points (CAPs) for shared access by USAID-funded NGOs in rural areas**
- **Need for general and sector-specific Internet related training**
- **Cell phones becoming common tool for use by NGOs including expanding use in provinces and in some cases for low-speed e-mail**

Within Cambodia, actual use is currently at a nascent stage. To date, use of ICT is based on a "champion" or "advocate" approach whereby some managers (either at USAID or within one of the NGOs with which USAID works) have a personal interest in the Internet and seek to incorporate ICT within their activities and programs.

While Internet e-mail is becoming an essential tool for communicating with NGOs in country, the region, and even their headquarters offices the U.S., at present the primary electronic means for the mission and NGOs to communicate with its local partners is via telephone or e-mail. This is typically one-to-one, though e-mail distribution lists are used for broadcasting messages where needed. The Open Forum of Cambodia provides a valuable low cost E-mail and ListServ function to the NGO community in Cambodia, but is prevented by the MPTC from providing more expanded Internet Services such as Web-based calendaring, shared calendars, etc. This artificial restriction is simply unwarranted and should be addressed.

Adding more sophisticated services to the NGO community would be a major improvement. However, there is still the issue of access once outside Phnom Penh. The telecom providers are moving into the provinces and this will provide the backbone for extending at least e-mail into at least some of the outlying areas. However, even with the telecommunications access, there are the other issues relating to gaining physical access and making use of the tool (e.g., computer, Internet connection, costs, and training). One possible solution is to launch a small, but collective initiative to establish small provincial and rural Community Access Points (CAPs) whereby the NGOs with which USAID (and others) partner can gain access to ICTs on a shared cost-basis. These CAPs can also become a valuable resource to the local community much like cyber cafés provide shared access in the urban areas.

Being new there is also the need to provide some basic awareness, education, and technical training to USAID/Phnom Penh staff as well as the NGO community with which it works so closely. Examples of how the Internet is being used as a research tool, by specific development sectors, etc., would be invaluable. A number of options are available for providing these services to the international development community in Cambodia.

USAID/Cambodia Development Portfolio

This ICT Assessment was carried out as part of an overarching ANE Bureau focus on ICTs. However, it has taken into account the local USAID/Cambodia development portfolio. This has significantly shaped the dialog, focus on the interviews within country, and the recommendations developed as part of the Assessment effort. The USAID/ Cambodia program contains the following Strategic Objectives (SOs):

- SO 442-001: Strengthen Democratic Processes and Respect for Human Rights
- SO 442-002: Improving Reproductive and Child Health
- SO 442-004: Enhance Assistance for War and Mine Victims
- SO 442-005: Reduced Transmission of Sexually Transmitted (STI) and HIV/AIDS in High-Risk Populations
- SO: 442-007: Expanded Access to Sustainable Financial Services

People – General Recommendations

General Recommendations: People

- **Pilot Community Access Points (CAPs) for supporting NGO-related activities in Provincial cities**
- **Expand ICT-related awareness, knowledge, and skill base within NGO community**
- **Enhance Internet-based services being provided to NGO community beyond E-mail**
- **Pilot cyber-mall for NGOs seeking to market products and services to improve their financial sustainability**
- **Provide targeted ICT-related support within the context of existing and planned NGO-related activities**

At present the NGO community relies increasingly on E-mail and telephony for improving their communications amongst themselves and to each other. This is especially the case within Phnom Penh where many of the NGOs have their Cambodian offices. With respect to communicating between these offices and those operations in the provincial cities, this becomes increasingly problematic. The focus on the recommendations here is to focus attention on enhancing these capabilities via a shared approach such that even

the smallest local NGO located in rural areas have increased access to the Internet, and that this is done such as to become economically sustainable.

16. **Pilot Community Access Points (CAPs) for supporting NGO-related activities in provincial cities**—In a growing number of countries the reliance on shared access via a local community-level Telecenter or Community Access Point (CAP) in rural areas is the only form of affordable telephony or Internet access. Typically these are put in place within the context of an existing development activity (e.g., education, agriculture, health center, etc.), but with expanded access to the community at large. This allows the services to be provided on a for-fee basis and also serve additional development activities. This recommendation puts forward the establishment of a series of such CAPs in selected locations as pilot projects to determine their viability in Cambodia. The most logical location for establishing these CAPs would be with NGOs working in targeted areas where there is telecommunications access via one of the current private sector firms, and there is a local presence for building the requisite technical support. The target result would be to provide needed ICT/Internet support to as wide a range of development activities as possible, and to do so in such as manner that these provide the CAP with income, that, along with income from private/individual use, allows the CAP to become financially sustainable as quickly as possible.
17. **Expand ICT-related awareness, knowledge, and skill base within NGO community**—Whereas the international development organizations (NGOs/PVOs) make use of ICTs and the Internet in conducting their business, this use is very limited by the local NGOs/PVOs beyond E-mail, and even here, frequently limited to offices located in urban centers. With the piloting of CAPs in provincial cities and even rural villages, there is the need to develop a broader awareness, knowledge, and skill base within the local NGO/PVO community on how these ICTs/Internet can become an integrated part of carrying out their development activities. Where a CAP is established, this would most logically be carried out in conjunction with the CAP or through the CAP itself. In other areas the awareness, knowledge and skill base training would be carried out through other means—most logically through a local NGO dedicated to providing ICT-related services or via a contract to a local firm.
18. **Enhance Internet-based services being provided to NGO community beyond E-mail**—As the Internet becomes more available, including non-urban centers via CAPs (see earlier recommendation/s), it will be possible to not only extend the use of the Internet to additional locations, but also to provide enhanced services. Efforts need to be undertaken to gain agreement with the MPTC to allow the development community to expand use of the Internet beyond the current use of E-mail. This current restriction (something for example Open Forum for Cambodia must live with), is simply unwarranted and without rationale. Whereas such services could readily be provided through one of a limited number of ISPs in Cambodia, or even "off-shore" by hosting in the U.S. or a neighboring country, in both situations the costs would be considerably higher than offering locally by an NGO. Services could be extended beyond the E-mail and ListServs and include expanded information sharing, collaboration tools, etc.

19. **Pilot Cyber-Mall for NGOs seeking to market products and services for improving their financial sustainability**—A growing number of NGOs are starting to make use of the Internet for marketing products and services over the Internet. This is oriented toward expanding the awareness of their services and becoming more self-sustaining. In comparison to individual sites, a cyber mall reduces costs and increases the potential for reaching a larger market. A collective effort should be undertaken whereby one of the value-added services provided to the NGO community working in Cambodia is the development and hosting of Websites and the development of a cyber-mall to support those NGOs seeking to carryout commercial transactions. This may well lead to the establishment of mirrored Websites in target countries (e.g. the U.S.) in an effort to achieve high performance of the Website and to eliminate any e-commerce/e-business restrictions that may currently exist. It may also require the establishment of small inventories of products in the U.S. to facilitate quick and low-cost delivery to customers. The Website should also be used for donation-oriented fund-raising similar to what is taking place in the U.S. and other developed countries. A key target market for such an effort would naturally be the Cambodian diaspora living abroad.

20. **Provide targeted ICT-related support within the context of existing and planned NGO-related activities**—During the course of this ICT Assessment, a limited number of NGOs were visited and in several locations, opportunities identified where the use of ICTs/Internet could be a valuable addition to the current development activities. Part of the awareness and education needed is on the part of the professional development staff in the various donor organizations whereby they are made aware of the potential for adding ICTs/Internet into their program/activity design. This will naturally be undertaken on a case-by-case basis. One of the key focuses here should be not only on the potential use, but where possible, on leveraging this use such that it becomes a demand for shared services provided in rural communities via Community Access Points (CAPs). In this way, the donor community and their development activities create a demand-oriented situation whereby this demand is satisfied collectively via a locally operated and owned CAP, providing an income source for the CAP rather than building the ICTs/Internet access with the confines of the NGO and development activity itself.

Appendix A – G-8 Okinawa Summit Summary

As recently as July 2000, the leaders of the world's most power nations met at the G-8 Summit in Okinawa, Japan, and as part of their agenda addressed the concerns of the global digital divide. The result was the development of the Okinawa Charter on Global Information Society, and the launching of Digital Opportunity Task Force (dubbed the "DOT" Force).[15] The DOT Force will mobilize resources and coordinate the efforts of governments, the private sector, foundations, multilaterals, and international institutions and others to bridge the international digital divide and create digital opportunities.

This Okinawa Charter and the DOT Force were undertaken in recognition that the developing countries are not fully participating in the information revolution. It was acknowledged that the following situation exists:

- Of the estimated 332 million people online as of March 2000, less than 1 percent (2.77 million) live in Africa (Nua Internet Survey, March 2000);
- Less than 5 percent of the computers that are connected to the Internet are in developing countries; and
- The developed world has 49.5 phone lines per 100 people, compared to 1.4 phones in low-income countries (International Telecommunications Union, 1999).

The global call to action coming out to the G-8 Summit called upon companies, foundations, and non-government organizations to help create digital opportunities for the people of developing nations to take concrete steps in five strategic areas:

- Fostering Policy, Regulatory, and Network Readiness: Help developing countries adopt practices, and regulatory frameworks that will encourage private sector investment but also reap the full economic, social, and cultural benefits of the widespread diffusion of the Internet, e-commerce, and other information and communications technologies;
- Expanding Basic Connectivity to People Everywhere: Support the expansion of community access points or other forms of shared connectivity so that the Internet and telecommunications services are within walking distance for everyone on the planet. Invest in R&D that will lead to products and services tailored to the needs of developing countries and poor communities everywhere, such as low-cost, low-power, wireless devices;
- Building Human Capacity in Education and Training: Increase significantly the number of people in developing nations with the technology skills and know-how needed to build, manage, and effectively use the information infrastructure of the 21st century. Equip more people in developing nations become "technologically literate" through the

[15] http://www.ecommerce.gov/ecomnews/pr0725001.html.

appropriate use of educational technology in schools, universities, communities, and the workplace;

- Enhance Healthcare and Quality of Life Using Information Technology: Promote applications of the Internet and information technology--such as e-health, distance learning, natural resource management, and preservation of cultural heritage, that have particular relevance to improving the quality of life for the people of the developing world; and
- Create New Opportunities for Small and Medium-sized Enterprises through e-commerce and e-business: Encourage the development of micro-enterprises and small businesses that harness the power of new information and communications technologies. In all societies, develop venture-financing sources that can drive innovation.

With regard to the United States, then President Clinton, in partnership with corporate and non-profit leaders, announced several new steps to bring digital opportunities to developing countries.[16] This included expanding the number of countries participating in the Internet for Economic Development (IED) Initiative. In addition, President Clinton announced several new ICT-related initiatives involving the Ex-Im Bank, the Overseas Private Investment Corporation (OPIC), as well as several additional public-private, multilateral, and foundation-sponsored activities aimed at narrowing the digital divide gap.

This ICT Assessment is predicated in large part on the recognition of the very same dynamics as reflected in the G-8 Summit's "Call to Action." Further, this Assessment puts forward an integrated set of proposed activities that hold substantial promise for bringing about a catalytic change for bringing about fundamental changes within the Cambodian economy.

[16] http://www.ecommerce.gov/ecomnews/pr0725002.html.

Appendix B – Digital Economy 2000

On 5 June 2000, the U.S. Department of Commerce (DOC) issued the third annual report on the information technology revolution and its impact on the U.S. economy, titled "Digital Economy 2000."[17] This series of reports has been critical to providing a more comprehensive understanding on the direct and indirect role/impact of the ICT sector within the U.S. In introducing the report, then Vice President Gore presented several key highlights from the report:

- IT accounts for half or more of the improvements in productivity since 1995. With 2.8 percent productivity growth from 1995 to 1999--double the 1.4 percent rate of 1973 to 1995. The U.S. has a new economy. Improved productivity has lowered inflation and raised real wages;
- IT is lowering inflation. Falling IT prices have directly pulled down average inflation by 0.5 percentage points a year. In addition, by raising productivity, IT is lowering inflation of other industries; and
- The IT sector is rapidly creating jobs at high wages. IT jobs average $58,000 a year, 85 percent higher than the average for the private sector. Between 1994 and 1998, employment in IT industries expanded by 30 percent, from 4.0 million to 5.2 million jobs. IT occupations that pay the best and require the most education have been growing most rapidly.
-

William M. Daly, then Secretary of Commerce, writes in the Report's preface:[18]

> *"What we can see clearly are expanding opportunities. To meet these opportunities, we will have to ensure a stable and conducing economic and legal environment for continuing innovation in information technology and e-commerce. We need to encourage the building of a broadband infrastructure that allows all Americans to have access to the advanced services that support the Internet, and take the steps necessary with respect to privacy, consumer protection, security, reliability, and intellectual property rights that will inspire confidence in the Internet. To realize the full potential of this digital economy, every person and every business must be able to participate fully and make their own unique contribution to its development."*

The Executive Summary of the Report provides a strong message with regard to the impact on ICTs within the U.S. economy. In addition to the above highlights, these include:

- The Internet in particular is helping to level the playing field among large and small firms in business-to-business e-commerce;

[17] http://www.ecommerce.gov/ecomnews/pr060500.html.
[18] http://www.doc.gov.

- There is growing evidence that firms are moving their supply networks and sales channels online, and participating in the new online marketplaces;
- Advances in information technologies and the spread of the Internet are also providing significant benefits to individuals;
- The vitality of the digital economy is grounded in the IT-producing industries--the firms that supply the goods and services that support IT-enabled business processes, the Internet, and e-commerce;
- Although IT industries still account for a relatively small share of the economy's total output--an estimated 8.3 percent in 2000--they contributed nearly a third of real U.S. economic growth between 1995 and 1999;
- IT industries have also been a major source of new R&D investments;
- New investments in IT are helping to generate higher rates of U.S. labor productivity growth;
- Growth in the IT workforce accelerated in the mid-1990s, with the most rapid increases coming in industries and job categories associated with the development and use of IT applications;
- Analysis of the computer and communications industries in particular suggest that the pace of technological innovation and rapidly falling prices should continue well into the future; and
- Businesses outside the IT sector almost daily announce IT-based organizational and operating changes that reflect their solid confidence in the benefit of further substantial investments in IT goods and services.

While the above reflects current dynamics taking place in the U.S. economy relative to the ICT sector and its broader impact on the economy, it also reflects the potential value of ICTs in other economies--including developing and transitioning economies. Clearly, the potential leveraging capabilities of ICTs within Cambodia are considerable with regard to assisting USAID/Cambodia in meeting its objectives, and in bringing about fundamental benefits to the Cambodian economy and its people.

Cambodia: ICT Assessment

Appendix C – Summary of ANE Bureau's ICT Program

Developing the Internet across Asia and the Near East
The U.S.A.I.D. Global Information Infrastructure Project

Purpose: Information and Communication Technologies (ICTs) are powerful tools for stimulating economic growth and social change. The quality of, and access to, information are critical to the successful application and adoption of ICTs by society. ICTs cut across all USAID traditional sectors: health, community development, governance, economic growth and education. They enable groups working on common issues to benefit from each other's experiences and share best practices. They can:

- Provide access to improved education and health in remote or inaccessible areas through distance learning, telemedicine, and interactive training;
- Improve services to citizens by providing on-line access to government/public services; enable individuals and communities to make informed choices in the decision making process; and
- Reduce business costs while opening access to new markets through electronic commerce.

Program Description: Across Asia and the Near East region, Internet and e-commerce is an emerging reality, but there are a number of key impediments to make it an everyday business practice. As the U.S. government recognizes the critical need for its partner countries to be engaged in Internet and e-commerce development, the ANE Bureau has adopted the 4 "P" approach to successful Internet development: (1) Policy, (2) Pipes, (3) Private Sector, and (4) People.

1. "Policy" - Opening doors through policy reform to permit the introduction and growth of information and communication technologies, reducing barriers to open connectivity, and ensuring that global electronic commerce can take place in an open and transparent fashion.

2. "Pipes" - Demonstrating the effectiveness of appropriate hardware and software by utilizing the latest in technology such as wireless, high speed data transfer, secure transaction capability, extending the Internet to underserved areas, and working with private sector Internet Service Providers to offer a range of services to clients.

3. "Private Sector" - Ensuring the private sector "can do what it needs to do to be successful." This entails combining "Policy" reform and "Pipes" improvement with ensuring there are sufficient, well trained technicians to support the build-out of ICT industries.

4. "People" - Implementing new approaches to sustainable social and economic development through Information and Communication Technology tools. It is critical to the success of the program that USAID's partners use the Internet and other ICTs as tools for development.

Project Goal: The goal of the Asia and Near East Information and Communication Technology program is to have all ANE Missions promoting one or more of the "4-P's" within their development portfolio.

Project Countries: Algeria, Bangladesh, Cambodia, Egypt, India, Indonesia, Jordan, Lebanon, Mongolia, Morocco, Nepal, Palestinian Authority, Philippines, Sri Lanka, and Tunisia.

Project Countries Activities at a Glance (As of June 2001):

COUNTRIES	ASSESSMENT	POLICIES	PIPES	PRIVATE SECTOR	PEOPLE
Algeria	Jan '01	✓		✓	
Bangladesh	Sept '00	✓		☑	✓
Cambodia	June '01				✓
Egypt	Aug '00	☑	☑	☑	☑
Gaza/WBank	Aug '00	☑	☑	☑	☑
India	March '00	✓			☑
Indonesia	Jan '01	✓		✓	✓
Jordan	Sept '99	☑	☑	☑	☑
Lebanon	March '01				☑
Mongolia	July '00			☑	
Morocco	Sept '99	☑	☑		☑
Nepal	April '01	✓			✓
Philippines	Dec '00	☑		☑	☑
Sri Lanka	Dec '99	✓		✓	
Thailand	Nov '01			✓	✓
Tunisia	Oct '00		✓	✓	
Vietnam	Sept '01			✓	✓

✓ = Proposed/ Planning Stage
☑ = Engaged in

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www.usaid.gov/regions/ane/ict/internet.htm

Appendix D – Networked Readiness of Cambodia

During this last year, several independent initiatives have surfaced in an effort to evaluate either the "e-readiness" or "networked readiness" of a given country. Two of these tools are one from McConnell International and Harvard University. Both of these are considered valuable tools and are included in brief here due to their contribution in rounding out the assessment of Cambodia.

McConnell International's Global E-Readiness Report
August 2000

In August 2000, McConnell International issued their first E-Readiness Report.[19] This report assessed the current e-readiness of 42 critical national economies including Cambodia. The report provides an independent public assessment of one of the most important economic question of the early 21st century: "Who is poised to prosper in the networked economy."

"E-readiness" measures the capacity of nations to participate in the digital economy. E-readiness is the source of national economic growth in the networked century and the prerequisite for successful e-business.

The report looks at 5 E-Readiness attributes:

- **Connectivity** – Are networks easy and affordable to access and to use?
  - Availability of wireline and wireless communication services, community access centers (free and paid), and networked computers in businesses, schools, and homes.
  - Affordability and reliability of network access, including the cost of service, downtime, and the prevalence of sharing access among individuals.
  - Reliability of electrical supply for business-critical computer operations; and the ease of importing and exporting goods and of transporting them within a country.
- **E-Leadership** – Is e-readiness a national priority?
  - Priority given by government to promoting the development of an e-society on a national level.
  - Extent of demonstrated progress on e-government, including efforts to automate governmental processes.
  - Quality of partnerships between industry leaders and government to improve E-Readiness.
  - Level of effort to promote access for all citizens.
- **Information Security** – Can the processing and storage of networked information be trusted?
  - Strength of legal protections and progress in protecting intellectual property rights, especially software.

[19] http://www.mcconnellinternational.com.

    - Extent of efforts to protect privacy.
    - Strength and effectiveness of the legal framework to address and prosecute computer crimes, authorize digital signature, and enable public key infrastructures.
- **Human Capital** – Are the right people available to support e-business and to build a knowledge-based society?
    - Quality of and participation levels in the education system, with an emphasis on efforts to create and support a knowledge-based society.
    - Culture of local creativity and information sharing within the society.
    - Skills and efficiency of the workforce.
- **E-Business Climate** – How easy is it to do e-business today?
    - Existence of effective competition among communication and information services providers.
    - Transparency and predictability of regulatory implementation, openness of government, rule of law, and general business risk (political stability, financial soundness).
    - Openness to financial and personal participation by foreign investors in ICT businesses.
    - Ability of the financial system to support electronic transactions.

The E-Readiness Report uses a red, amber, and blue rating system for assessing countries in each of these five areas:

- **Blue** – indicates the majority of conditions are suitable to the conduct of e-business and e-government
- **Amber** – indicates improvement needed in the conditions necessary to support e-business and e-government
- **Red** – indicates substantial improvement needed in the conditions necessary to support e-businesses and e-government

Neither the August 2000, nor the more recent May 2001 report from McConnell International included data on Cambodia. However the May 2001 report does have information regarding neighboring Thailand and Viet Nam. Both countries were rated red in connectivity, information security, human capital, and e-business climate, and rated amber in e-leadership). It is anticipated that an assessment of Cambodia would likely be consistent with these two countries. However this position is ***not*** based on any structured analysis of hard data undertaken by McConnell International, but rather based on the discussions and information gathered as part of this USAID-led ICT assessment.

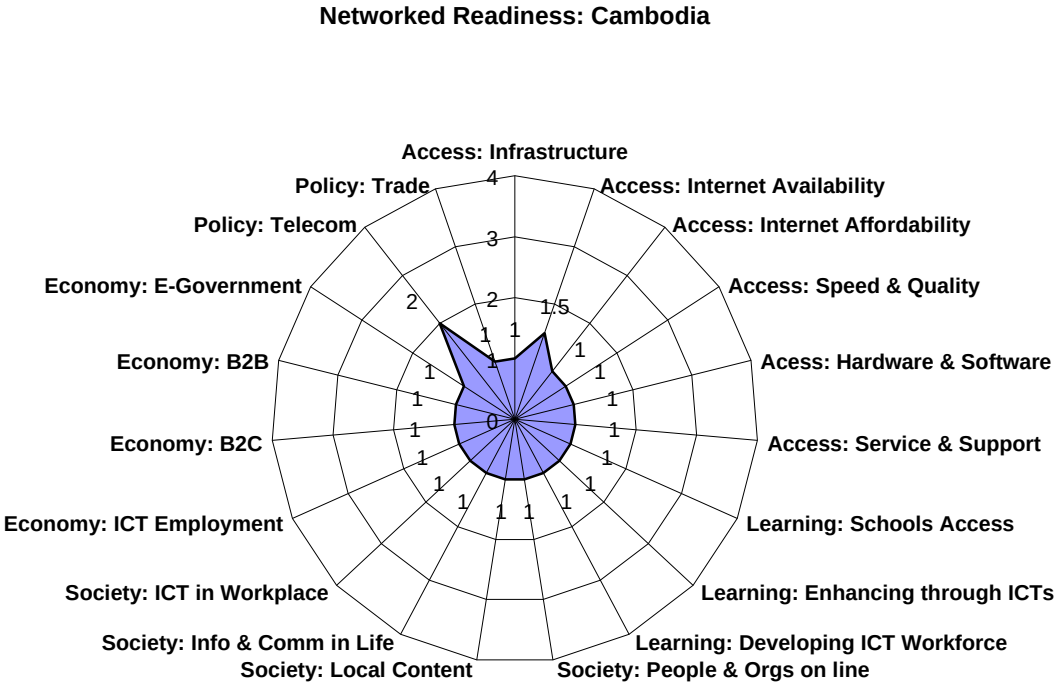
For more information on the details of this report, refer to their website at http://www.mcconnellinternational.com or Roslyn Docktor (Vice President) at docktor@mcconnellinternational.com.

Harvard's Readiness for the Networked World: A Guide for Developing Countries

The Information Technologies Group (ITG) at the Center for International Development at Harvard University[20] has not as yet evaluated individual countries, but instead has created a "Readiness for the Networked World: A Guide for Developing Countries." As stated in the Guide, *"This Guide is an instrument that systematically organizes the assessment of numerous factors that determine the Networked Readiness of a community in the developing world."*

The following assessment has been prepared relying on the published by the Information Technologies Group (ITG) at the Center for International Development at Harvard University. It is included here as part of this ICT Assessment in an effort to gain familiarity with the guide, to test its validity, and to determine its potential value in similar such efforts in the future.

The following provides a graphic representation of the values determined for each category. The following pages provide a description of each of the five groups (e.g., Access, Learning, Society, Economy, and Policy) and each category (e.g., Infrastructure, Internet Access, …) that has been extracted from the guide. Refer to the Readiness Guide itself for complete instructions, descriptions of each category, and the descriptions of each of the 4 stages (1-4) for the categories.



[20] http://www.readinessguide.org.

Harvard's Readiness Guide: Groups and Categories Descriptions

Network Access

What are the availability, cost, and quality of ICT networks, services, and equipment?

The minimum necessary condition for readiness is access to adequate network infrastructure. Without access to global communications networks, no community can participate in the networked world. Access is determined by a combination of the availability and affordability of use of the network itself, as well as of the hardware and software needed for network interface. The quality and speed of the network are also important in determining how the network is used. The customer service orientation of access providers is a major factor in network application adoption and usability.

Because of the growing importance and unique character of the Internet, which provides a global platform for both data and (increasingly) voice services, the assessment of network access should be carried out in the context of Internet access, rather than access to either voice or data. The significance of the Internet will only continue to grow in terms of global trade and communications.

- **Information Infrastructure**—For most communities in the developing world, a lack of access to voice and data services remains a significant impediment to Networked Readiness. Communications infrastructure is deployed with widely varying local and regional rates of penetration, depending on factors such as geography and/or income levels. Local network access may be provided by any one of a number of media that makes up the communications network (including twisted pair copper wires, coaxial cable, wireless local loop, satellite, and fiber optics). While in the future, mobile wireless technologies will undoubtedly provide an attractive option for data access, as will cable networks and perhaps even the electrical grid, currently most Internet access in the developing world is provided through the traditional telecommunications network.
- **Internet Availability**—Internet access is enhanced by competition among Internet Service Providers (ISPs) that operate locally. The range of services offered, number of dial-up lines (which helps determine ISP capacity) and transmission capacity all influence an ISP's usefulness. The availability of leased lines is particularly important in making the Internet available to the business community. Finally, in many communities in the developing world, public access is essential to making the Internet available to greater numbers of individuals and firms. Telecenters, Internet cafes, and community information centers assume great importance in making the Internet available to those who do not have personal access to home, school, work, or elsewhere.
- **Internet Affordability**—The prices, which businesses and individual consumers pay for the Internet access, are in most cases determined by a combination of fees for basic telephony and ISP services. In communities where the sum of ISP and telephony fees is prohibitively high, a disincentive to network usage exists, and access is curtailed. Pricing packages can be structured in ways that are conducive to Internet use—per minute or hourly pricing (unlike flat rate pricing) for both Internet and telephone service can limit

users' time online an therefore inhibit the use of the network for many activities such as electronic commerce (e-commerce). The provision of tiered pricing packages can improve the affordability for many subscribers by allowing them to purchase only what they need.

- **Network Speed and Quality**—The available bandwidth, both for individuals' local access and for a community's connection to the Internet backbone, determines the number of users and types of online activities the network can support. Bandwidth-intensive activities, such as large file transfers or video streaming, may be unavailable to communities with constrained access to the network. The quality of the network, including servers, also determines its usage. High numbers of mainline faults, poor connections, dropped connections, and packet loss can render any network useless or operationally sub-optimal, thus discouraging use of and investment in new technologies.
- **Hardware and Software**—A vibrant market with numerous hardware and software options can encourage more specialized usage of the network, including ICT solutions that are tailored to local needs. More widespread retail and wholesale distribution channels for both hardware and software increases opportunities to use the network within the community. The prices of hardware and software are particularly important in the developing country context, where generally low-income levels cannot support high-priced consumer items.
- **Service and Support**—A strong customer service orientation is important in determining the success of network deployment. Long waiting periods for installation and repair and a lack of support services by telephone companies and Internet providers pose major obstacles to Readiness. The quality and number of technical support professionals are essential in maintaining the network and providing service.

Networked Learning

Does the educational system integrate ICTs into its processes to improve learning? Are there technical training programs in the community that can train and prepare an ICT workforce?

Without an educated, ICT-savvy populace, no community can fully participate in the networked world. To foster this resource, ICTs must be incorporated into the learning system. Lamentably, although the use of ICTs in education is one of the most powerful catalysts to networked readiness, it is an opportunity that is often squandered, misunderstood, or underestimated.

- **Schools Access to ICTs**—Schools must integrate ICT tools into their learning processes if they are to be part of the networked world. Programs that give students access to ICTs in the classroom provide an important step to improving readiness. A school's Readiness in terms of access can be broken down into six broad areas: number of computers, physical access to the technology, types of computers, diffusion of the network, access to and organization of electronic content, and quality and speed of connectivity in the school. In general, the diffusion of ICTs is driven by unit cost per pupil. Computers tend to be adopted first at the university level, then by the secondary school system, and finally by the primary schools.

- **Enhancing Education with ICTs**—While putting ICTs into schools is an important first step to readiness, the technologies need to be properly harnessed to improve the learning process. Teachers must be trained to use the Internet and computers as tools for the students' benefit; this training is central to readiness. Curricula must be redesigned to encourage the use of ICTs in the pursuit of problem solving, group learning, and research. Students should be taught from the earliest age possible to use ICTs to enhance and improve their learning experiences. Full integration of ICTs into the learning process is optimal, and collaborative, project-based learning can make up a solid pedagogical strategy for ICT-enhanced education.
- **Developing and ICT Workforce**—It is essential that there exist opportunities within the community to offer future ICT workers both first-time and continuing training in essential skills such as software programming, hardware engineering and World Wide Web design. These opportunities are fundamental to creating a sustainable ICT industry and support the integration of ICTs into the local economy.

Networked Society

To what extent are individuals using information and communications technologies at work and in their personal lives? Are there significant opportunities available for those with ICT skills?

Readiness depends upon the community's incorporation of ICTs into the fabric of its activities in order to maximize the gains of joining in the Networked World. In society-at-large, ICTs can have a profound effect upon people's professional and personal lives by providing easier access to information, more efficient ways to communicate, and powerful organizational tools. To understand how a community is using ICTs, it is important to assess not only how many members of the community have access to the technologies, but also how they are using them.

- **People and Organizations Online**—One of the hardest indicators to track is the actual number of online users. Particularly in the developing world, where multiple users share many electronic mail (e-mail) accounts and other online tools, there are few reliable indicators that accurately map how many people are online. The exponential growth in online usage also makes tracking current use difficult. This nevertheless an important indicator. As more people access the Internet regularly, and networks of users grow, there is grater demand and opportunity for online interaction, as well as better meshing with the networked world at-large. As more organizations gain an online presence, it becomes more likely that the community will use ICTs to augment or carry out its activities and needs. One of the most important drivers of online growth is awareness—people must first know and understand what the Internet is in order to participate. Particular attention should be paid to the demographics of Internet users in the community. Particularly at lower stages in readiness, groups such as women, the physically disabled, and racial and ethnic minorities often do not participate in the online environment. A community is more ready when there are not large discrepancies in online presence among different groups.

- **Locally Relevant Content**—Community members find the Internet medium more useful and relevant to their own lives when online content reflects their own interests and needs. Locally relevant content is a major driver of growth of Internet usage. Interactions such as chat rooms, online interest groups, special interest software, bulletin boards, listservs, and Web sites all drive the community to use ICTs more widely in their lives. English language dominance on the Internet remains a serious impediment to the world's non-English speaking communities. While the preponderance of English is waning, and other world languages are gaining, most of the world does not speak a language that is strongly represented either in software or on the World Wide Web.
- **ICTs in Everyday Life**—Communities participate more directly in the networked world when information devices such as radios, faxes, televisions, telephones, pagers and computers are culturally accepted and widely incorporated into daily life. It is important to examine both the penetration of ICT devices into community and their applications. In communities where either income levels or the network infrastructure cannot support high levels of individual access, public shared facilities provide a needed alternative. Such venues may include telecenters, cyber cafés and community information centers. Strategies for drawing people in to use these facilities is essential.
- **ICTs in the Workplace**—The more that businesses and government offices are already using ICTs, the better prepared they are to participate in the global networked economy. In order to realize important efficiency gains from ICTs, businesses and governments need to not only make technologies available to their employees, but also effectively incorporate them into their core processes.

Networked Economy

How are businesses and governments using information and communications technologies to interact with the public and with each other?

Businesses and governments that are able to effectively employ ICTs find more sophisticated and efficient ways to managing their external relationships and communications. This growing ICT usage helps form the critical mass of electronic transactions which supports a networked economy, both in terms of the network size and the demand for associated goods, services, labor, and policy reform.

- **ICT Employment Opportunities**—A thriving job market for ICT professionals provides added incentive for growth of ICT adoption, training programs and overall use of ICTs within the economy. The retention of technical workers becomes an important competitiveness issue for the community.
- **Business-to-Consumer (B2C) E-Commerce**—Online retail options enhance consumer choice and access to products. They also allow businesses to reduce costs associated with physical infrastructure and to augment their marketing outreach and public relations via a dynamic communications channel.
- **Business-to-Business (B2B) E-Commerce**—When businesses move their dealings with other businesses online, they can often communicate more easily at lower costs, hold smaller inventories, and process billings and payments more quickly, among other

advantages. Moreover, networked businesses are likely to explore new business models, including dynamic business partnerships and radical market restructuring.

- **E-Government**—Governments can take advantage of ICTs to improve connections with their constituents, including using the Internet to post information online and to offer interactive services for the public. Governments can also lead by example and become a catalyst for the networked economy by investing in ICTs for their internal use, leading to more efficient operations and the creation of a local market for ICT equipment and services. Relationships with government contractors and procurement mechanisms can be streamlined by putting them online. ICTs can make government activities more transparent to citizens and other observers.

Network Policy

To what extent does the policy environment promote to hinder the growth of ICT adoption and use?

Public policy can be help or a hindrance to the networked economy. The favorable climate that public policy can create for Internet use and e-commerce encourages communities, organizations, and individuals to invest in and use ICTs. Important aspects of networked readiness dealt with elsewhere in the guide (such as Internet availability and affordability, hardware and software availability and affordability, ICTs in school, and electronic commerce) are all influenced by public policy. For a community to become ready for the networked world, the appropriate policy-makers must realize the implications of their decisions upon ICT adoption and use.

- **Telecommunications Regulation**—Effective regulation should promote competition, ensure affordable pricing for consumers and maximize telecommunications access in the community. Liberalization within the telecommunications sector should establish a regulatory framework that encourages multiple carriers to operate competitively. As more operators enter and compete in the marketplace, service offerings become more accessible and affordable, are deployed more rapidly and reach higher levels of quality. At the same time, regulation should encourage universal access to telecommunications services.
- **ICT Trade Policy**—ICTs become more available and affordable when there are low barriers to trade, including tariffs on ICT equipment and software, and electronically ordered or delivered goods and services

Cambodia: ICT Assessment

Appendix E – Telecom: Paths Towards Liberalization

One of the current dynamics in telecommunications is a broad-based movement on the part of countries to liberalize their telecommunications sector. Frequently the starting point is a wholly owned government monopoly—most often in the form of a combined Postal, Telegraph, and Telephone (PTT) Ministry. Within the PTT there is typically a Public Telecommunications Operator (PTO) that is responsible for day-to-day operations of all domestic and international, voice and data, telecommunications. In the most restrictive environments there is no private-sector engagement with the possible exception of some private networks for transnational firms with offices located in the country.

The above situation is most often characterized by a telecommunications structure that is frequently inadequate to support the nation's growing requirements. Typically there is inadequate investment to expand the infrastructure, poor quality of service, long waiting lines for basic telephony services, low teledensity (ratio of phones per population) operational inefficiencies and ineffectiveness, artificially-inflated long-distance and international rates, and subsidized local services.

As the importance of telecommunications has become increasingly recognized as being a critical component for supporting social and economic improvements, an increasing number of countries have embarked on programs to improve their current default conditions. This typically includes a series of orchestrated steps that progressively decreases the government's operational role, increases their direction/regulatory engagement, and increases the role of the private sector for operations.

Naturally each country's approach toward liberalizing their telecommunications sector is unique and based on their local political, economic, and technical realities. Typically this liberalization is undertaken in a series of steps—each building on prior actions, and each laying a foundation for subsequent initiatives. While the individual paths and sequence of activities vary considerably country-to-country, increasing the telecommunications coverage, lowering costs/prices, and securing private sector financing and participation, are increasingly commonly-shared characteristics.

The following represents a somewhat "idealized" approach for architecting a country's telecommunications liberalization activities. This is presented as a general sequencing of steps that can be considered near optimal, again recognizing that local conditions will ultimately dictate the sequence, aggressiveness, as well as the timeline ultimately undertaken by any country.

Firm and Broad Political Commitment—It is not uncommon for the PTO to have ardent national supporters for maintaining the status quo, especially by those that likely will lose some level of political power. In addition, there is frequently considerable lobbying support by the workers that may involve strong union support to protect the workers (at times too many workers). It's also likely that the PTO represents a certain focal point for generating local

"nationalism" that can be leveraged by the unions and those not wanting any change. It is critical that an initial step be establishing broad and unwavering political support for embarking on what will likely entail a multiyear set of interrelated actions that will at times require strong commitment to "stay the course." These will ultimately bring about the changes associated with liberalizing the country's telecommunications sector—moving it from a government monopoly to a competitive private-sector sector.

New/Updated Telecommunications Law—The first critical expression of this political commitment is the drafting, lobbying, and passage of a new or updated telecommunications law. This will ultimately become the cornerstone, the reference point for all subsequent actions and it is essential that this be well thought out, comprehensive, articulate, and with as few ambiguities as possible. Salient characteristics of this law should address the establishment, role, scope, authority, power, and independence of a telecommunications regulator. In addition, it should lay the foundation for developing more detailed and subsequent rulemaking, regulations, administrative procedures, dispute resolution authorities, etc. In addition, the law should establish the parameters for the future of the PTO and possibly the future stages for introducing competition into the sector. Care should be taken to use the Law to establish the framework and authorities, with limited implementing details such that a regulator does not need to secure changes or even implementation via subsequent legislation. Also, to the extent possible, the authorities granted to the regulator should be articulated such as to maximize the resolution of conflict via their internal processes—limiting the need for conflict resolution to escalate to the court system.

Establishing an Independent Regulatory Function & Commission—Using the new telecommunications law as a foundation, a new independent Regulatory Commission (RC) should be separated out of the PTT or created from scratch. Issues here will be the level of actual independence the RC has and who it reports to. Also, it is critically important to establish a performing organization and the actually commissioners with as minimal political compromise as possible. For many smaller countries, the telecommunications regulatory function/commission is typically melded into a single organization that handles other utilities such as water, electricity, and wastewater treatment. To the extent possible, this new entity should join with existing regional regulatory associates in an effort to promote some level of commonality and parity/normalization with neighboring countries. Also, the regulatory body most often becomes the official national representative on multilateral bodies such as the ITU, WTO, etc. Staffing the new regulator entity is also a critical component as there is the need for those with independence of the operations and the need for a wide-array of knowledge/skills to include legal, technical, engineering, management, and administration.

Establishing a strong regulator (along with subsequent rules and regulations) is an absolutely essential component for ultimately enticing private sector investments into the country—be it selling off all or part of the PTO, or selling licenses for mobile telephony or Internet. Investors must be assured early that the process is in place and transparent, that there is openness and fairness, that it is well managed and thought out. These elements are essential for ensuring that future investors will not be at risk. Time spent here in establishing a strong regulator along with an open and transparent process, will yield tremendous dividends when later new licenses are

issued for new entrants and the government-owned telecommunications are later sold to private investors (all or partial).

Separating the Telecommunications Operations from Postal—By definition, the typical PTT combines both postal and telecommunications into a single organization. One of the initial moves toward liberalization, besides setting up an independent regulator, is to organizationally separate out the PTO from the consolidated Ministry. Frequently, this is undertaken to "corporatize" the PTO whereby it has an orientation that begins to operate on a near-privatized mode even through it remains a government-owned and operated monopoly. It is an interim step towards creating a situation where it has more parity with a private operator—a valuable situation when later the incumbent's operations are wholly or partially privatized. This separation is also be aimed at improving the operational efficiencies and effectiveness with regard to establishing a more business-like cost structure, managing investments, developing human capacity, etc.—elements that will add value of the operational entity such that when it is privatized (all or in part), a higher price can be realized.

Introducing Multiple Private Mobile Wireless Operators—Typically one of the key issues facing most developing countries is the lack of telephony access. It's not uncommon for teledensity (number of phones per 100 inhabitants) to be in the range of 10-15:100, but at times can be as low as 1-10:100. Most developed countries are on the order of 50-70:100, not taking into account mobile wireless. Mobile wireless telephony frequently becomes a substitute for landlines and has a number of inherent advantages that include such characteristics as: a) more rapid build-out, b) lower cost of build-out, c) relatively simply interconnection, d) high demand, and e) excellent solution for low-density rural areas. Typically, the incumbent PTO is grandfathered with a mobile wireless license and in many cases they have already entered this market. Ideally at least one additional license will be granted, perhaps more—depending on the potential market. This is frequently the country's initial experience with introducing multiple private-sector players into the local telecommunications market. It is an ideal first step due to the characteristics outlined early. In addition, even when only one new entrant is allowed into the local market (in addition to the incumbent) it places competitive pressures on the PTO as the speed of build-out can quickly erode the landline backlog (e.g., potential customers and thus income).

The key regulatory issues needing attention with the introduction of mobile wireless operators primarily revolve around interconnection-related issues such as location of interconnection points, performance of establishing interconnection, establishing related costs structures, tariff setting, and revenue sharing. Other key issues that are addressed include frequency allocations, technology standards (e.g., GSM, TDMA, CDMA, 3G), and dispute resolution procedures (they must be transparent, fair and fast). Considering the ultimate number of complexities associated with managing a telecommunications environment with multiple private players in the local market, this is a relatively small list of issues and comparatively simply (though perhaps not easy). There are also literally hundreds of models and examples to follow that allow for quick resolution—providing the foundation, as outlined earlier, has been established. Experience has shown than in many countries the number of phones put into service by these mobile wireless new entrants can quickly exceed the number of landlines serviced by the incumbent.

Strengthening the Regulator—With a new telecommunications law in place that makes provision for an independent regulator, there is the need to develop the new organization and the knowledge/skill levels of those hired into the new entity. This requires a comprehensive approach that must include a wide number of knowledge/skills as well as deriving this education and training from a variety of sources. Knowledge and skills are primarily needed in telecommunications-related legal, technical, and economics. Sources for acquiring the knowledge/skills are considerable and include such sources as university degree program in all three areas, and a wide-range of organizations supporting the telecommunications sector. A few of the potential sources for obtaining short-term and long-term support for telecommunications regulators are as follows:

- United States' Federal Communications Commission (FCC) for short-term, educational missions, and at times, some longer-term training. They are also in the process of developing on-line/CD-ROM based training
- United States Technology Transfer Institute (USTTI) is a non-profit organization supported by U.S. high tech companies with USAID support. Typically the courses are short (2-3 weeks) and are company/technology specific. USAID funds the travel, per diem and the firms fund the actual training.
- National Association of Regulatory Utility Commissioners (NARUC) is a US-based association of state Public Utility Commissions (PUCs) that have an international program and can be relied on for longer-term mentoring and on-the-ground support.
- International Telecommunications Union (ITU) located in Geneva, Switzerland is another source of published materials as well as seminars and workshops that support regulatory (as well as other topics) knowledge/skill building
- Regional regulatory organizations are also of value in exchanging information, experiences, approaches, etc., that have special value in harmonizing approaches between neighboring countries.
- Commercial consultants also provide specialized support in the area of telecommunications regulation. These exist in virtually every country and typically require multiple sources even here as the breadth of coverage is so large.

The key in relying on any of these sources is that there be very specifically targeted needs identified within the new regulatory organization and that a comprehensive plan be developed. Because developing this human capacity will take several years, ideally this should be linked directly with the priority of the issues needed to be addressed by the regulator (e.g., interconnection, tariff setting, cost-base pricing, national numbering, universal service/access policy and implementation, Internet, etc.). As mentioned earlier, this is one of the considerations in introducing new mobile wireless into a country with a new regulator as there are a limited number of variables needing to be addressed in order to move forward on a very critical piece—expanded telephony coverage.

One area within the regulator's purview that needs special attention is the need for establishing a high-quality spectrum management capability. With wireless technologies becoming so critical for obtaining rapid build-out of both telephony and data/Internet, the frequencies must be managed. Typically a Spectrum Management Authority (SMA) is put into place or strengthened—including new monitoring stations, databases, application review/licensing

procedures, knowledge and skill building. In that spectrum licensing can be a source of revenue, this is well worth additional focus.

Developing Rules, Regulations, Administrative Processes—Typically the telecommunications law provides but a framework, general direction, and requisite authorities. It is the skeleton upon which a lot of meat and flesh need to be hung. If one were to look at the ratio of law relative to rules, regulations, and supporting administrative procedures (e.g., vetting of new rules/regulation proposals, licensing, dispute resolutions), the ratio of text is likely to be 1:100 or most often much greater. There is a misconception that "de-regulation" actually means less regulation. In fact, the opposite is usually the case and the word is a misnomer. Under the default condition of a government owned and operated PTT there is typically no regulation to speak of. And with the introduction of the private sector and multiple players into the telecommunications sector, more, not less regulation is required! While the goal is certainly to have a more open, transparent, and competitive environment, in fact this must be a managed environment. The environment becomes more complex with more players and added services introduced into the country's environment, and the rules, regulations, and administrative procedures are essential for establishing this order early, and maintaining it over time. It is not uncommon for the RA to gain transparency of their activities by developing a rich Internet website and keeping those interested in this topic well informed of their activities. This can even progress to the point of soliciting public comment on drafts and applying for telecommunications licensing (especially frequency-related licensing).

Introducing Multiple Private Data/Internet Operators—With the growing importance of the Internet this area is another service that frequently receives early attention with regard to opening up access and introducing private sector participation. In many ways it is a strong corollary to mobile wireless in that it is in high demand, adds significant value-added services into the country, and the complexity of the regulatory issues needing to be addressed are relatively simple. There are a several approaches that are used with regard to the extent to which the private sector becomes (or is allowed to become) engaged in this Internet arena. First: The typical default is that the PTT handles everything including the role of the Internet Service Provider (ISP) with no private sector engagement. Second: More typical is the situation where the PTT handles the international access (via landline, optical fiber, or satellite/VSATs) and resells Internet access to commercial private sector ISPs who invest in hardware and software in order to provide value-added services to a growing customer base. The PTT also leases the requisite lines to/from the ISPs and the Internet access as well as lines needed to support local customer access through the local phone distribution system. Third: A more ideal scenario is where the private sector is allowed (via supporting law and regulation) to obtain their own Internet access via whatever route is available (but typically via satellite/VSAT) rather than being beholden to the PTT. The ISP must still lease their lines from the PTT for customer access through the local phone system, but for high-volume commercial customers the ISP is allowed to obtain frequency licenses for delivering access without this infrastructure. In a more fully open environment the ISPs are also allowed to achieve customer access via cable systems as well as the local phone system.

It should be noted that when the PTT retains the only access point for international Internet access, with private sector ISPs providing the value-added services, there are typically a number

of problems that surface and retard growth of the Internet. These problems typically work against the private sector ISPs and to the advantage of the PTT. Some of the typical problems are: a) the PTT setting up its own ISP and competing directly with the private sector—only on a somewhat favored basis (e.g., providing ISPs and customers with more dialup lines, enabling toll-free access from any location in the country, providing quicker and higher-quality services, and even offering lower pricing or free ISP access), b) content filtering/censorship, c) providing more capacity to their own ISP when there is a shortage of Internet capacity out of the country, d) near absolute power to add a premium price for use of phone lines used by the ISPs over normal telephony, with no recourse on the part of the ISPs, and e) absolute power in establishing the pricing for Internet access out of the country, again without any recourse or alternative on the part of the ISPs.

Full or Partial Privatization of the Government-Owned PTO—One of the common approaches for obtaining private sector participation in the telecommunications sector is the selling off of a portion of the Public Telephone Operations (PTO). It is not uncommon for this to be accomplished in a series of public tenders where the initial sale is a 25-35 percent equity position—at times with an option for more if additional equity is sold in the future (e.g., Sri Lanka and Japan's NTT). There are some situations in which the percentage bought is in the range of 35 percent but with a provision that the buyer obtains a majority voting right (51 percent). OTE did this in Romania. In other situations a majority position is actually bought (e.g., 90 percent of ArmenTel bought by OTE). Typically the purchase is linked directly to a provision that the firm be allowed to enter into any future telecommunications-related value-added service in the future. Also, that they be allowed to maintain a monopoly on identified services for a prescribed set of years—barring new entrants from eroding their potential market for a period of 5-15 years. At times the entire PTO is sold to a private firm (as it was in Jamaica to Cable and Wireless—with a 25-year monopoly provision and an option for another 25 years).

It is not uncommon for the partial or total selling off of the PTO to be driven by the need for the country's need to obtain foreign currency, with little relationship to telecommunications issues. Another driver is typically the need to obtain investments (typically foreign) to provide broader telecommunications coverage in country. While the issue of granting an extended monopoly as part of the condition of sale is typically the major issue, another key issue is establishing the level and timing of investment commitments for expansion of the national network and interconnection issues where other operators already exist or will be allowed to operate in country. With regard to the monopoly issue, it's not simply a matter of whether or not it is allowed to exist and for how long. The more important issue is "what does it cover?" If it is limited to the domestic landline network, then the potential damage is actually quite limited. If it includes international voice access, then it is not so benign but may be needed as a financial incentive. But if the monopoly pertains to mobile and fixed wireless and international Internet access, then simply put, the costs is likely too high, no matter what commitments are made for network expansion. Competition in these sub-sectors is essential for rapid build-out and to keep competitive pressures on the incumbent landline provider.

Allowing Multiple Entrants for Local Telephony Distribution—Yet another phase in the telecommunications sector liberalization is the introduction of alternative telephony distribution systems and private sector participants. This is typically one of the later phases of market

liberalization undertaken. The incumbent telephony provider remains a dominant position and frequently still retains a monopoly on the international voice such that all the new entrants still must go through the incumbent for switching services between the various providers and for accessing international voice services. Technologies that can be used to provide local telephony (besides the incumbent provider's landlines) include cable operators, mobile wireless (discussed above), fixed wireless, and small new-entrant landline providers (typically small rural community or regional systems allowed to operate in areas where the incumbent is not currently providing services). In the U.S. non-facilities based new entrants in theory can provide telephony services over plant owned and operated by the incumbent, but this is not likely to take off even in the U.S. market, let alone in developing countries—at least not in the foreseeable future.

This stage of liberalization raises a wide range of complex issues that require a strong and highly competent regulatory body. In addition to setting the direction, the regulator must be well prepared to deal with cost-based pricing, tariff rebalancing, interconnection issues, a national numbering plan and enforcement, number transfer, a number of technology standards related topics, quality of service standards and monitoring, etc. This requires a very mature regulator and private sector firms in the market.

One of the more important components that must be addressed prior to allowing new entrants into the domestic telephony market is the issue of tariffs. It is most common when a single monopoly provider (public or private) provides domestic local, domestic long-distance, and international services, that the tariff structure is such that there is considerable cross subsidization taking place. Typically long-distance and international calls are priced substantially higher than actual costs and local calls are frequently priced below actual costs. A similar situation can occur between business and residential customers—businesses paying higher prices than comparable residential use. Obviously if it costs more to provide the local service than the rate structure will support, no investor is going to enter the market. On the other hand, if new entrants are allowed to service only business and long-distance domestic and international, they can quickly erode the revenue stream of the incumbent such that this cross-subsidization can no longer occur. This tariff rebalancing of cost/pricing must be addressed and normalized by the incumbent before the market can be opened up for multiple private sector players. As a result, this rebalancing can at times delay the introduction of competition in the domestic telephony market and rate rebalancing frequently takes place over several years. As a side note: this issue is very similar to the concern incumbents have for Voice over IP (VoIP), where it can erode the high-margin long-distance and international voice traffic leaving the incumbent with lower margins and the requirement to provide local service where they actually lose money.

Introducing Multiple Players in the International Telephony—One of the last bastions of telecommunications market liberalization is that of international voice. As mentioned above, it is possible (and ideal) to separate international voice and data and allow data/Internet access early in the liberalization process. Some countries have taken this route, including Romania, Sri Lanka, Morocco, and others. Where in the past international voice has been a real "cash cow" for the PTOs, in recent years this has eroded considerably based in part on pressure by the FCC in their international tariff negotiations. However, as mentioned above, it's still major source of

revenue with high margins for most countries—margins used in many situations to off-set losses in delivering local services.

As a default, typically the PTO has made arrangements through a single international provider and anyone seeking international access simply passes through the national infrastructure to the monopoly's international access point. When competition is introduced into the domestic market (wireless, cable, or landline) this infrastructure arrangement remains and the new entrants must rely on the national gateway/access point owned and operated by the incumbent. Technologically moving from this default situation to one with multiple providers is relatively straight forward—where a more open national access point is established with multiple firms being allowed to provide access to the national infrastructure and customers allowed to choose their international carrier. As can be imagined, however, there are a number of regulatory and implementing details required to support this expansion.

Another approach used in some countries is to include in the licensing of new entrants (e.g., mobile wireless) a provision that for a set number of years they must rely on the incumbent for their international access. But after 2-3 years they are free to establish their own international connectivity. This approach places competitive pressure on the incumbent to rebalance their tariffs to a cost-based approach and provides a significant incentive for those bidding on the mobile wireless license such that the price they're willing to pay will likely be higher as their future revenues will also be higher. This was the approach taken in Morocco where the nation wide GSM license went for US$ 1.2 billion.

NOTE: Refer to the Bibliography reflected as Appendix G for detailed reference materials associated with liberalizing telecommunication environments.

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Appendix F – 1999 ITU Statistics

Each year the International Telecommunications Union (ITU) publishes a World Telecommunications Development Report[21] that provides statistical data for all countries. Its most recent comprehensive report issued on 10 October 1999 included an expanded set of data that for the first time included data on mobile cellular. In addition to this worldwide report, on December 2000 the ITU published an Asia-Pacific Telecommunication Indicators 2000[22] report that concentrated only on the Asia-Pacific region and reflected updated data (1999 statistics).

This report provided an excellent source of base data for examining the "pipes" portion of our analysis—upon which addition and updated information was collected and included into the analysis of the telecommunications infrastructure in Cambodia. This region-specific report included data on Asia-Pacific countries as grouped into the following categories:

- **Lower-Income countries**: Bangladesh, Cambodia, China, Fiji, India, Indonesia, Kiribati, Lao P.D.R., Malaysia, Maldives, Nepal, Pakistan, Papua New Guinea, Philippines, Samoa, Solomon Island, Sri Lanka, Thailand, Tonga, Vanuatu, and Viet Nam;
- **Upper-Income countries**: Brunei Darussalem, French Polynesia, Guam, Hong Kong SAR, Korea (Republic), Macau, New Caledonia, Singapore, and Taiwan-China
- **Developed Countries**; Australia, Japan, and New Zealand.

For purposes of this analysis, Cambodia data has been extracted from the recent ITU Asia-Pacific report and compared to: a) the neighboring countries of Lao P.D.R., Thailand, and Viet Nam, b) the country averages in each of the three country income categories used by the ITU, and c) the average for all Asia-Pacific countries. The following tables provide more details of the situation in Cambodia. Following each table are keynotes clarifying some of the data on the tables, as well as short comments with respect to what one may conclude from the data, regarding Cambodia.

While these averages provide a benchmark for comparing Cambodia with countries in the Asia-Pacific region, it is important to recognize that this data includes the countries of China (with a population placed at 1,266.84 million) and India (with a population of 998.06 million). These two countries alone account for over 70 percent of the regional population and nearly 60 percent of its regional GDP as reported by ITU. Also included in this data is Indonesia with its population of 209.25 million, which is also large enough to impact regional data (3rd largest population in the Asia-Pacific and 4th largest populated country in the world). Cambodia with its population of just 11 million is small even in comparison to neighboring Thailand and Viet Nam with populations of nearly 61 million and 79 million respectively.

[21] World Telecommunications Development Report—1999. Mobile and World Telecommunications Indicators. ITU. Geneva, Switzerland. 10 October 1999.

[22] Asia-Pacific Telecommunications Indicators 2000. ITU. Geneva, Switzerland. 3 December 2000

Basic Indicators

Country	Population - 1999		GDP – 1998		Main Phone Lines	
	Total (Millions)	Density (per km)	Total (US$ B)	Per Capita (US$)	Totals (000s)	Teledensity
Cambodia	**10.95**	**60**	**2.1**	**196**	**27.7**	**0.25**
Lao P.D.R.	5.30	22	1.3	250	34.5	0.65
Thailand	60.86	118	112.1	1,859	5,215.6	8.57
Viet Nam	78.71	239	26.0	335	2,105.9	2.68
Lower-Income Total/Avg.	3,196.34	139	2,380.7	755	170,435.7	5.33
Upper-Income Tot/Avg.	80.93	489	856.0	10,672	38,742.7	47.89
Developed Tot/Avg.	149.30	18	4,216.4	28,292	82,263.9	55.10
Asia-Pacific Tot/Avg.	3,426.57	109	7,453.1	2,204	291,442.3	8.81

NOTES:

1. Calculations for GDP vary considerably based on source and calculations used. However, here it is presented by ITU's methodology and normalized across all countries in a consistent manner and therefore retained for comparison purposes.
2. Teledensity is the number of phones per 100 inhabitants

Observations:

- Cambodia has a significantly higher population density than Lao P.D.R. (60 per square kilometer compared to 22) however it has a significantly lower population density than neighboring Thailand and Viet Nam (118 and 239 respectively) as well as the other lower-income countries in the region (population of 60 per square kilometer for Cambodia compared to a lower-income country average of 139);
- Cambodia's calculated Per Capital GDP (of US$ 196) is significantly below neighboring countries of Lao P.D.R (US$ 250), Thailand (US$ 1,859, and Viet Nam (US$335), and as well as other lower-income countries in the region (with Cambodia's per capita GDP for 1998 placed at US$ 196 as compared to an average for the lower-income countries in the Asia-Pacific region of US$ 755);
- Cambodia's teledensity of 0.25 (telephone lines per 100 inhabitants) is significantly below the average for both its neighboring countries of Lao P.R.D (at 0.65), Thailand (at 8.57) and Viet Nam (at 2.68) as well as the averages for the lower-income countries in the Asia-Pacific region (at 5.33); and
- It should be noted that with China's population of 1,266.84 million and a reported teledensity of 8.58, the lower-income average for teledensity average for the region is somewhat inflated due to China alone. Factoring China out of the lower-income teledensity average, the teledensity average is closer to 3.20—which still places Cambodia's teledensity substantially below the regional average for lower-income countries.

Main Telephone Lines

Country	Main Telephone Lines			Teledensity		
	1995 (000)	1999 (000)	CAGR % 1995-1999	1995	1999	CAGR % 1995-1999
Cambodia	**8.5**	**27.7**	**34.3**	**0.08**	**0.25**	**32.1**
Lao P.D.R.	16.6	34.5	20.1	0.36	0.65	16.0
Thailand	3,482.0	5,215.6	10.6	5.86	8.57	10.0
Viet Nam	775.0	2,105.9	28.4	1.05	2.68	26.3
Lower-Income	74,19.9	170,435.7	23.1	2.45	5.33	21.4
Upper-Income	32,864.5	38,742.7	4.2	42.53	47.87	3.0
Developed	71,724.8	82,283.9	3.5	42.53	47.87	3.0
Asia-Pacific	178909.2	291,442.3	13.0	5.49	8.51	11.5

NOTES:

1. CAGR = Compound Annual Growth Rate

Observations:

- Between 1995 and 1999, Cambodia's growth in main telephone lines has been rapid and at a compound annual growth rate (CAGR) of 34.3, it outpaced the rate of its neighboring countries (Lao P.D.R, being 20.1%; Thailand being 10.6%; and Viet Nam being 28.4%). This growth rate is also above the lower-income country average for the region (with a of 16.6 percent compare to a lower-income country average for the Asia-Pacific region of 23.1 percent). However it must be acknowledged that the base upon which this rapid growth rate is taking place is very low (only 8,500 main lines in Cambodia in 1995);
- Viewed from a teledensity perspective, Cambodia's growth in main lines is slightly less as a percent of real growth (32.1% versus 34.3 percent), but still this growth is substantial and outpaces that of both neighboring countries and the lower-income countries in the Asia Pacific region (32.1% compared to 21.4%);
- Clearly there is some "catching up" taking place within Cambodia and the other lower-income countries relative to the upper-income and developing countries in this region (CAGR for lower-income countries being 21.4 percent and only 3 percent for upper-income and developed countries. But there's a long way to go (note: growth rates typically do start to drop off when a country reaches a teledensity level of 30-40. Also the growth in deployment of mobile wireless telephony frequently serves as a substitute for main telephone lines and therefore must be factored in); and
- China and India again have a significant impact on the averages for the lower-income countries in the Asia-Pacific region as between the two of them, the number of their main telephone lines account for 71 percent and 79 percent of the number of lines in the Asia-Pacific region for 1995 and 1999 respectively.

Local Telephone Network

Country	Main Telephone Lines - 1999				Faults per 100 Main Lines/year 1999
	Capacity Used (%)	Automatic	Digital (%)	Residential (%)	
Cambodia	**99.7**	**100.0**	**100.0**	**---**	**35.1**
Lao P.D.R.	81.3	---	99.5	80.3	---
Thailand	68.4	100.0	100.0	67.0	178
Viet Nam	75.4	100.0	100.0	50.0	---
Lower-Income	72.0	99.9	97.8	78.9	103.5
Upper-Income	81.6	100.0	85.2	72.8	1.5
Developed	---	100.0	100.0	69.6	46.0
Asia-Pacific	73.6	100.0	96.7	75.2	63.7

NOTES:

Observations:

- Cambodia's build-out of infrastructure is such that there is virtually no expansion capacity to support more growth in the number of lines (with 99.7 percent of the capacity used as of 1999). This can become a serious limitation to expansion even in mobile expansion where the market supports several mobile operators that must rely on the switching of the dominant land line carrier for interconnections;
- Cambodia's telephone system is 100 % digital; and
- With respect to faults per line per year, Cambodia's numbers ranks amongst the better in the entire Asia-Pacific (with 35.1 faults per 100 main lines per year compared to 103.5 for lower-income countries);

Teleaccessibility - 1999

Country	Residential Main Lines		Public Telephones		
	Total (000s)	Per 100 Households	Total (000s)	Per 1000 Inhabitants	As % of Main lines
Cambodia	**---**	**---**	**0.30**	**0.03**	**1.09**
Lao P.D.R.	22.9	2.9	0.23	0.04	0.81
Thailand	3,496.6	22.4	139.25	2.29	2.67
Viet Nam	593.2	3.9	0.95	0.01	0.08
Lower-Income	107,041.9	22.5	4,053.21	1.32	2.61
Upper-Income	28,047.5	112.1	745.06	9.23	1.93
Developed	51,667.0	97.5	820.47	5.50	1.00
Asia-Pacific	186,756.3	33.8	5,618.74	1.70	2.03

Observations:

- Unfortunately the ITU data is not available with regard to the number of main lines for residential use (ac compared to business and public telephones; and
- Cambodia has one of the lowest public telephone access of all the countries across the Asia Pacific region. Not only is the teledensity low in general (e.g., per person or per household), but this appears not to be compensated by the reliance on publicly available telephone (only 1.09 percent of the total main lines compared to 2.61 percent for lower-income countries in the region.

Largest City Main Lines - 1999

Country	Largest City				Rest Of Country	Overall County Teledensity
	Population as % of Total	Main Lines		Teledensity		
		(000s)	% of Total			
Cambodia	**9.5**	**16.5**	**59.4**	**1.59**	**0.11**	**0.25**
Lao P.D.R.	8.0	---	---	---	---	---
Thailand	11.4	2,587.1	49.6	37.13	4.88	8.57
Viet Nam	4.8	497.6	23.6	13.27	2.15	2.68
Lower-Income	3.3	16,116.1	11.1	16.23	4.27	4.65
Upper-Income	29.6	13,505.8	35.9	56.23	43.85	47.61
Developed	9.1	9,921.5	11.2	72.31	53.75	55.34
Asia-Pacific	4.1	38,643.4	14.7	28.46	7.00	7.87

NOTES:

Observations:

- The ITU data reflects the predominance of Cambodians living in smaller towns and rural areas (with only 9.5 percent living in the largest city). While this percent reflects substantially more than the average for lower-income countries in the Asia-Pacific region (9.5 percent as compared to 3.3 percent), this is due in large part to the data being skewed by the large populations of China and India where the percent of urban population is considerably less than Cambodia (China being 1.2 percent living in large cities and 1.7 for India);
- Cambodia's teledensity data is not only extremely low, it reflects a gulf between the number of main lines available to those living in the largest city of Phnom Penh (with a teledensity of 1.59) as compared to those living in the rural areas (where the teledensity is 0.11). This translates into approximately 16 phones for every 1,000 living in the larger cities, and only 1 phone for every 1,000 people living in smaller cities and rural areas; and
- This city/rural difference in Cambodia is more pronounced than in all the neighboring countries as well as the other lower-income countries in the Asia-Pacific region.

Telephone Tariffs - 1999

Country	Residential (US$)		Business (US$)		Local Calls US$	% GDP per Capita
	Connection	Monthly Subscription	Connection	Monthly Subscription		
Cambodia	**120**	**13.0**	**120**	**13.0**	**0.03**	**74.7**
Lao P.D.R.	91	1.5	91	1.5	---	7.3
Thailand	89	2.6	89	2.6	0.08	1.6
Viet Nam	129	4.4	129	4.4	0.08	17.5
Lower-Income	104	4.2	111	6.1	0.06	9.2
Upper-Income	70	9.3	73	16.2	0.08	0.7
Developed	261	14.1	261	23.6	0.08	0.9
Asia-Pacific	109	6.4	114	10.1	0.07	6.4

NOTES:

- The **% GDP per capita** column is the subscription cost as a percent of GDP per capita and is calculated based on 1998 GDP and population data.

Observations:

- Cambodia's connection and monthly subscription pricing (US$ 120 and US$13) for both residential and business is significantly well above the neighboring countries of Lao P.D.R (US$ 91 and US$ 1.50), Thailand (US$ 89 and US$2.60), but slightly lower than the connection costs of Viet Nam (at US$120) but still above Viet Nam's monthly subscription rate (US$ 4.40). It is well above the other lower-income countries in the region (with an average connection fee of US$ 104 and a monthly subscription of US$ 4.20).
- Cambodia's local call rates of US$ 0.03 are well below the neighboring countries that are US$ 0.08 and the lower-income country after for the Asia-Pacific regional countries (at US$ 0.06).
- As a percent GDP per capita Cambodia's telephone tariffs appear to be completely out of line with any other country—neighboring, regional, or global. As defined by the ITU report, *"the subscription as a percent of GDP per capital shows cost of an annual residential telephone subscription as a percent of the Gross Domestic Product per capita."* This figure for Cambodia is placed at 74.7 percent—meaning that nearly 75 percent of a an individual's income (calculated on a per capita GDP basis) would need to be committed to owning and operating a telephone. The average for a lower-income country in the region is placed at 9.2 percent; and
- These numbers indicate that there may be some reason to suspect the pricing for making local calls could be well below actual costs and there is the need for some tariff cross-subsidization and the need for some rebalancing to take place (needs further detailed analysis).

Cellular Subscribers

Country	Cellular Mobile Subscribers					As % of Total Telephone
	Subscribers (000s)		CAGR % 1995-1999	Teledensity 1999	% Digital 1999	
	1995	1999				
Cambodia	**14.1**	**89.1**	**58.6**	**0.81**	**71.3**	**76.3**
Lao P.D.R.	1.5	9.0	55.7	0.17	100.0	20.8
Thailand	1,297.8	2,339.4	15.9	3.84	44.1	31.0
Viet Nam	23.5	328.7	93.4	0.42	78.4	13.5
Lower-Income	6,872.4	57,119.9	69.8	1.79	84.4	25.1
Upper-Income	3,596.5	41,111.7	83.9	50.80	98.9	51.5
Developed	14,319.1	64,227.6	45.5	43.02	97.9	43.8
Asia-Pacific	24,788.0	162,459.1	60.0	4.74	93.4	35.8

Observations:

- Cambodia's growth in Cellular subscribers between 1995 and 1999, while slightly lower than other lower-income countries in the Asia-Pacific region (CAGR of 58.6 percent compared to 69.8 percent), is higher than neighboring Lao P.D.R with a CAGR of 55.7 percent and Thailand with a GAGR of 15.9 percent. It is however lower than Viet Nam's CAGR for this same period of 93.5 percent;
- Several of Cambodia's mobile cellular operators are relying on analog rather than digital technology, with a percent digital use being off slightly from the Asia-Pacific averages (71.3 percent compared to 84.4 percent; and
- Over three-fourths of Cambodia's telephone subscribers are currently mobile subscribers (76.3 percent of the total telephone subscribers are mobile cellular). This makes Cambodia the highest percentage use of mobile cellular of any country. NOTE: Main lines teledensity was placed at 0.25; mobile cellular teledensity is placed at 0.81.

International Telephone Traffic – 1999

Country	Outgoing Telephone Traffic					International Circuits (000)
	Million Minutes		CAGR % 1995-1999	Minutes Per Inhabitant	Minutes Per Subscriber	
	1995	1999				
Cambodia	**5.2**	**7.3**	**8.9**	**0.7**	**263.5**	**0.5**
Lao P.D.R.	4.5	7.9	15.2	1.5	230.1	---
Thailand	232.7	298.7	6.4	4.9	57.3	7.1
Viet Nam	38.8	46.6	4.7	0.6	22.1	5.4
Lower-Income	3,116.7	4,557.3	10.0	1.4	26.7	127.7
Upper-Income	3,771.2	5,642.5	10.6	69.9	145.9	80.8
Developed	2,868.0	3,690.6	6.5	24.7	44.9	35.1
Asia-Pacific	9,756.0	13,890.4	9.2	4.1	47.7	243.5

NOTES:

Observations:

- Cambodia's growth in outgoing telephone traffic is somewhat less than other countries in the Asia-Pacific region with respect to growth between 1995 and 1999 (compound average growth rate of 8.9 percent for Cambodia and a 10 percent average growth rate for lower-income countries.). Note: this period includes several years of political turmoil/crisis;
- Cambodia's international traffic on a ***per inhabitant*** basis is also approximately half of other lower-income countries in this region (0.7 minutes compared to 1.4 minutes per inhabitant); and
- Cambodia's international traffic on a ***per subscriber*** basis is drastically higher than other lower-income countries in the Asia-Pacific region (263.5 minutes per subscriber as compared to 26.7 minutes for the Lower-Income country average), recognizing that this average is somewhat distorted due to large populations of India and China, and low minutes per subscriber (19.9 in both cases). Still, the numbers clearly reflect that there is a lot of shared use taking place, even though this is not via public access to telephones (as their numbers are very low).

Telecommunications Staff - 1999

Country	Telecommunications Staff (000s)		CAGR % 1995-1999	Main Lines per Employee		
	1995	1999		1995	1999	CAGR % 1995-99
Cambodia	**0.6**	**0.7**	**6.7**	**15**	**38**	**25.8**
Lao P.D.R.	0.9	1.1	7.4	19	30	11.8
Thailand	34.9	34.0	-0.7	100	153	11.4
Viet Nam	58.0	79.6	17.2	13	17	11.9
Lower-Income	1,235.2	1,466.7	4.4	59	114	17.9
Upper-Income	143.9	163.2	3.2	228	237	1.0
Developed	299.0	272.9	-2.3	240	301	5.9
Asia-Pacific	1,678.1	1,902.8	3.2	106	152	9.4

NOTES:

Observations:

- Data for Cambodia reflects that it's operational efficiencies are improving as the number of main lines being supported per employee is up considerably between 1995 and 1999 (15 per employee in 1995 to 38 in 1999); and
- However, these numbers are still substantially less than the lower-income average for the countries in the Asia-Pacific region—they are however better than those reflected for Lao P.D.R. in 1999 (30 lines/employee) and Viet Nam (17 lines/employee).

Telecommunications Revenue

Country	Telecommunication Revenue - 1999				
	Total (M US$)	Per Inhabitant (US$)	Per Main Line (US$)	Per Employee (US$)	As a % of GDP
Cambodia	**21.4**	**2.0**	**771**	**29,215**	**1.1**
Lao P.D.R.	22.8	4.3	662	20,064	1.7
Thailand	1,829.3	30.1	351	53,817	1.4
Viet Nam	640.8	8.1	304	---	2.4
Lower-Income	50,244.2	16.0	299	34,715	1.5
Upper-Income	34,017.5	420.8	881	209.701	3.2
Developed	153,334.4	1,027.0	1,864	571,504	2.9
Asia-Pacific	237,596.0	70.3	822	129,589	2.5

NOTES:

Observations:

- Cambodia's telecommunications revenue on a ***per inhabitant*** basis is one of the very lowest in the Asia-Pacific region ((US$ 2 compared to an average for the lower-income countries in the region being US$ 16)—even Lao P.D.R reflects a figure of US$ 4.30, Thailand US$ 30.10, and Viet Nam US$ 8.10;
- Cambodia's telecommunications revenue on a ***per line*** basis is well above the lower-income country average (US$ 771 versus US$ 299). Even this is understated in that this average is largely distorted due to China with its reported US$ 33,670.3 million in total revenues (out of a total for the lower-income countries of US$ 50,244.2 million) and US$ 310 per main line revenue. If China were factored out of the data, the average revenue per line for the lower-income countries would be substantially lower, reflecting Cambodia's revenue per line would reflect an even greater disparity between the average for lower-income countries in the Asia-Pacific region;
- To a large degree this relatively high revenue per main line is the result of low teledensity and therefore more use (thus revenue) per main line;
- Cambodia's telecommunications revenue as a percent of GDP is also amongst the lower in the Asia-Pacific region (telecommunications revenue being only 1.1 percent of GDP as compared to an average for the lower-income countries of 1.5 percent); and
- As stated in earlier numbers reflecting connection, subscription, and local call pricing, these numbers support the potential that current local call pricing could well be below costs and there is likely for some tariff cross-subsidization currently taking place (e.g., long distance and international) and the need for some tariff rebalancing is likely needed (this needs further detailed analysis); and

Telecommunications Investment

Country	Telecommunication Investment - 1999				
	Total (M US$)	Per Inhabitant (US$)	Per Main Line (US$)	As % of Revenue	As a % of GFCF
Cambodia	---	---	---	---	---
Lao P.D.R.	9.5	1.9	388	41.7	---
Thailand	357.0	5.9	68	19.5	1.1
Viet Nam	321.3	4.1	153	50.1	---
Lower-Income	25,761.2	8.2	153	51.5	4.1
Upper-Income	10,188.6	127.5	269	35.5	3.9
Developed	34,837.1	233.4	424	22.7	3.0
Asia-Pacific	70,786.9	21.1	246	30.5	3.4

NOTES:

- GFCF = Gross Fixed Capital Formation

Observations:

- Unfortunately no data is available for Cambodia in regards to telecom investments. The table is included here simply to illustrate base data of neighboring countries and the Asia-Pacific region.

Internet in Asia-Pacific - 1999

Country	# of ISPs	Internet - 1998				Personal Computers	
		Users (June 00)		Subs-cribers	Int'l Band-width (Mbps)	Total (000)	Pene-tration %
		(000s)	Pene-tration				
Cambodia	**2**	**5**	**0.05%**	**---**	**0.256**	**13**	**0.1%**
Lao P.D.R.	2	2	0.04%	---	0.064	12	0.2%
Thailand	14	1,000	1.64%	200	66	1,382	2.3%
Viet Nam	5	150	0.19%	45	2	700	0.9%
Developing	748	26,815	0.80%	5,466	857	31, 174	1.0%
4-Tigers	277	26,157	32.9%	15,802	3,252	16,553	20.9%
Developed	4,811	33,600	22.5%	12,683	3,496	47,350	31.7
Asia-Pacific	5,836	86,572	2.5%	33,951	7,605	95,077	2.8%

NOTES:

- Note different categories from earlier tables (e.g., Developing, "4-Tigers" and Developed
- 4 Tigers are: Hong Kong SAR, Korea (Rep), Singapore, and Taiwan-China

Observations:

- The ITU data reflects that as of June 2000, there were 2 ISPs operating in Cambodia;
- The ITU data reflects that there were, as of June 2000, 5,000 Internet users in Cambodia;
- On a percent of penetration basis, Cambodia's penetration of Internet is considerably below the average for the developing countries in the Asia-Pacific region (0.05% compared to an average of 0.80%);
- The ITU data reflects that there are only 13,000 personal computers in Cambodia.
- As a percentage of population, the number of personal computers within Cambodia is significantly below the average for developing countries in the Asia-Pacific region (0.1% compared to 1.0%);
- There are staggering differences in the penetration of the Internet and personal computers within the Asia-Pacific countries, when comparing the developing countries (including Cambodia) with the 4-Tiger countries and the developed countries (e.g., for Internet, less than 1% as compared to 33% and 22% respectively; and for personal computers, 1% as compared to 21% and almost 32% respectively); and

Dial-up Internet Access Prices in Asia-Pacific

Country	Internet Access Costs – October 2000 (US$)						
	ISP Fees					Telephone Call Charge[2]	Total Charge
	Sign-up Fee	Monthly Fee	Free Hours	Excess Time	Total Charge[1]		
Cambodia	**50**	**---**	**7**	**69.00**	**99.00**	**18.40**	**117.14**
Lao P.D.R.	58	33.00	35	---	33.00	---	33.00
Thailand	---	---	0	10.81	10.81	2.40	13.21
Viet Nam	19	3.21	0	31.43	34.64	7.57	42.41
Lower-Income	23	17.43	13	29.09	46.52	12.37	58.89
Upper-Income	2	17.94	7	3.82	19.35	23.50	42.85
Developed	---	21.19	40	---	21.19	21.01	42.20
Asia-Pacific	15	18.01	16	19.44	36.35	16.33	52.68

NOTES:

1. Total ISP Fees are amounts payable to the ISP calculated on the basis of 30 hours per month use.
2. Telephone Call Charge are amounts payable to the local telephone company for local telephone charges while logged onto the Internet based on 30 hours per month use (with half being peak and half being non-peak time)

Observations:

- ISP-related Internet access costs (signup, monthly, and excess time) are all quite high in Cambodia as compared to other lower-income countries in the Asia-Pacific Region (For sign up fee, US$ 50 compared to an average of US$ 23 for lower-income countries and that this provides minimal free time as part of the basic package;
- Total charges for having Internet access in Cambodia is over twice the lower-income country average for the Asia-Pacific region (US$ 99 compared to US$ 46.52);
- Telephone call charges for accessing the Internet in Cambodia are amongst the highest of the lower-income countries in the Asia-Pacific region, and well above the average for all countries (US$ 21.21 in Cambodia compared to US$ 12.37 for lower-income countries and US$ 16.33 for all countries in the Asia-Pacific region; and
- Clearly, even if physically available (and it's not to most of the population in Cambodia) the costs of Telephony and Internet access are prohibitive to the vast population. Few can afford phones and the Internet, and there is very limited shared access.

Cambodia: ICT Assessment

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