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**ICT Sector Development in Five Central Asian Economies: A Policy
Framework for Effective Investment Promotion and Facilitation**

Report*

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I. Introduction

Table 1.1 Central Asian Economies: Teledensities, Internet Users and Per Capita Incomes

	GDP Billion	Population Million	Per Capita Income	Effective Teledensity ¹	Internet Users/100
Kazakhstan	USD22.6	15.2	USD1,485	16.6	3.98
Kyrgyzstan	USD1.6	5.1	USD315	8.3	3.97
Mongolia	USD1.2	2.8	USD439	16.1	5.81
Tajikistan	USD1.3	7.2	USD188	3.6	0.83
Uzbekistan	USD6.9	26.9	USD257	7	2.90

Notes: 1. Fixed or mobile lines per 100 population, whichever is the greater

The objectives of this paper are, at the request of UN ESCAP, to (a) review the current state of ICT development and the investment climate for ICTs in the five Central Asian economies of Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan and Uzbekistan; (b) identify practices that have led to successful and less successful ICT development in various countries; and (c) identify the socio-economic impact, including poverty reduction and gender issues, of ICTs.

The paper is based upon visits made to each of the five countries between late July and the third week of August 2005.¹ In the research time available it is not possible to produce comprehensive and detailed reports and analyses of the policy developments in each country, and in fact such analysis would be very difficult because often the data is lacking or not easily available,² either because it is not collected on a systematic basis by any government agency, or because it is regarded as confidential information by the state or by the private sector.³ It is also the case that other researchers from agencies such as the UNDP and UNECE, the IFC and other bodies have produced useful surveys and where these are available they have been used in the following report which includes country 'profiles' that attempt to capture the essentials of ICT policy developments, the technologies available and the market situations in each of the five economies.

The central argument of this paper is that international donor agencies have traditionally offered advice, and funds, to support a 'best practice' approach to policy development, and that development has tended, certainly in the case of the Central Asian economies, to prioritize policy framework development as a precursor to specific policy instruments and actual policy implementation. While this is an entirely logical path of progression, and one often dictated by the legal and political environments of the recipient countries, it

¹ Dr Ure visited Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan, and Terence Graham, Mongolia. We wish to thank to the UNDP offices in each country for the unfailing assistance.

² 'There is however hardly any evidence for the impact of ICT on developing and emerging economies, including the post-communist countries transitioning from a centrally-planned to market economy.' Marcin Piatkowski (2004) *The Impact of ICT on Growth in Transition Economies*, TIGER Working Paper Series No.59, Leon Koziminski Academy of Entrepreneurship and Management, Warsaw, Poland; url <http://topics.developmentgateway.org/edevelopment/rc/filedownload.do-itemId=1026068>

³ The lack of transparency is certainly not a feature of governments alone. Privatization and open markets bring many benefits, but they can also produce market failure as happens when individual companies collectively withhold information that would benefit the whole industry and policy makers.

needs reconsideration and a refocus. In particular, the gap between policy frameworks and policy implementation needs to be addressed more directly, including the resources required to project manage actual reforms and ICT development programmes. The implementation process is constrained by the legal, political and economic realities of each country, and therefore the paper suggests that a ‘good practice’ approach is more appropriate than the traditional emphasis upon ‘best practice’ and its implication of ‘ideal types’. The paper contains Country Profiles organized under the headings: strategic ICT policy and regulation development, ICT technologies and ICT markets, each heading covering telecommunications, radio and TV, and IT hardware and software. These headings accord to a development model of the ‘virtuous spiral’ presented in the paper and used (at a high level) to assess ICT development within the five economies.

The paper is organized as follows. Section One deals with comparisons between the five Central Asian republics and other comparable economies. It defines ICTs, examines investment and ICT growth as questions of geography and trade, and considers the models of economic growth with respect to ICTs available to these countries and critically examines the traditional argument of donors and governments alike that emulating world ‘best practices’ is the way to develop effective policy making. It discusses ICTs and development, poverty reduction and gender issues. Section Two introduces a conceptual model first referenced by the author in a report for the World Bank in 2004, and uses it to suggest that ICT development in the Central Asian republics is held back not by policy frameworks but more by implementation problems. Drawing from this, Section Three proposes four priority areas for policy implementation. These relate to ICT for gender equality, project management skill, poverty reduction strategy and encouraging investment. This is followed by a Conclusion, and then by Appendix 1 that provides the Country Profiles of the five Central Asian republics and Appendix 2 summarizing Bilateral Free Trade Agreements in the CIS. The profiles are left till the end so the argument of the paper runs smoothly. The Country Profiles can be referred to at any time.

II. Comparisons

Which economies make suitable comparisons? The ‘best practice’ approach would suggest the most advanced economies of the OECD member countries, the USA, the UK, etc., the countries that have the most advanced and widely diffused ICT technologies driven by highly competitive markets and liberal economic and industrial policies. But the real gulf between these economies and the Central Asian countries seems too great to make comparisons very meaningful. The most developed nations may provide a range of ‘ideal types’ to which developing countries can aspire, but the key issues are about the practical steps the developing and transitional economies can take right now with very limited resources at their disposal. An alternative approach is suggested, based upon ‘good practice’. Good practice is the best that can be achieved within the constraints imposed by current circumstances. Therefore economies that suggest themselves for direct comparison are those with similar or slightly higher levels of per capita income that are also landlocked and in transition to market economies, in other words the landlocked countries of the former Soviet Union: Albania, Armenia, Azerbaijan, Belarus, Bosnia and

Herzegovina, Bulgaria, Czech Republic, Georgia, Hungary, Moldova, Romania, Serbia & Montenegro, Slovakia, Slovenia and the Ukraine.⁴

2.1 What Are ICTs?

ICTs include (a) the telecommunications infrastructure that provides access to two-way communications, and (b) computers that provide access to stand-alone information technology (IT) software, to information exchange over connecting networks, and to the Internet and the World Wide Web. There are other more basic ICTs, such as radio and TV which provide one-way broadcast of information and entertainment (two-way radio is considered telecommunications) but can easily become part of a two-way system.⁵ The aim of most governments is to achieve universal service, that is telecommunications on demand, but in developing countries this has not seemed to be a realistic option so far as the public switched telecommunications network (PSTN) is concerned. The alternative aim is to provide universal access, that is providing access to telecommunications through public access points such as public call boxes, private commercial telephone kiosks, community centres, 'telecentres', etc. But this picture is changing quite radically because of the rapid spread of mobile phones and the use of pre-paid cards, a phenomenon now being seen in Central Asia.⁶ There is a debate within the industry as to whether the spread of wireless mobile cellular is really the answer to the digital divide which separates those with access to the higher level ICTs, and especially to the Internet, from those without, but new broadband wireless technologies, such as WiFi (wireless fidelity) and WiMax are holding out the hope that wireless can provide the bandwidth necessary to browse the Web and download files. Other forms of wireless communications, for example fixed wireless access (FWA) using lower radio frequencies such as 450 MHz (lower capacity but covering longer distances) are offering cheaper ways to provide PSTN coverage to difficult service areas such as peri-urban and rural districts, and DAMA (dynamic assignment multiple access) satellite technology is offering, at a price, effective coverage of more remote and sparsely populated regions, such as mountainous areas.⁷

⁴ Albania has an Adriatic coastline, but is included as a low income transitional economy. The Montenegro part of Serbia & Montenegro also borders the Adriatic but Serbia is landlocked. Azerbaijan borders the Caspian Sea which, like the Aral Sea is landlocked. Bulgaria, Georgia, Moldova, Romania and the Ukraine all border the Black Sea but not the Mediterranean.

⁵ For example, in Sri Lanka community radio show hosts search the Internet to respond to inquiries from listeners. This provides indirect Internet access to rural fishing, farming and handicraft communities. TV stations increasingly use mobile phone SMS to encourage viewers to express opinions, which also generates revenues shared between the mobile operators and the TV stations.

⁶ Typically per minute call charges using pre-paid cards are more expensive than using post-paid, but pre-paid cards are sold in small money units that are affordable and allow users to control their budgets. Pre-paid cards also overcome most of the bad debt problems for operators. New services often permit users to transfer small sums of money from their cards to the cards of other users or to make purchases of low cost items in shops. Most significantly, pre-paid cards have revealed hitherto hidden demand, especially in peri-urban and rural areas.

⁷ The essential components of the traditional public switched telecommunications network (PSTN) are as follows. First, the local telephone exchanges that switch traffic along various circuits which remain connected during use. These are now being replaced by Next Generation Networks (NGNs) that use routers rather than switches to direct 'bits' of traffic using Internet Protocol/Transmission Control Protocol (IP/TCP) along whichever transmission paths are available at the time, thereby doing away with permanently connected circuits. This is known as 'connectionless' transmission. Second, exchanges are

Effective teledensity by per capita GDP 2005 data for central Asia countries

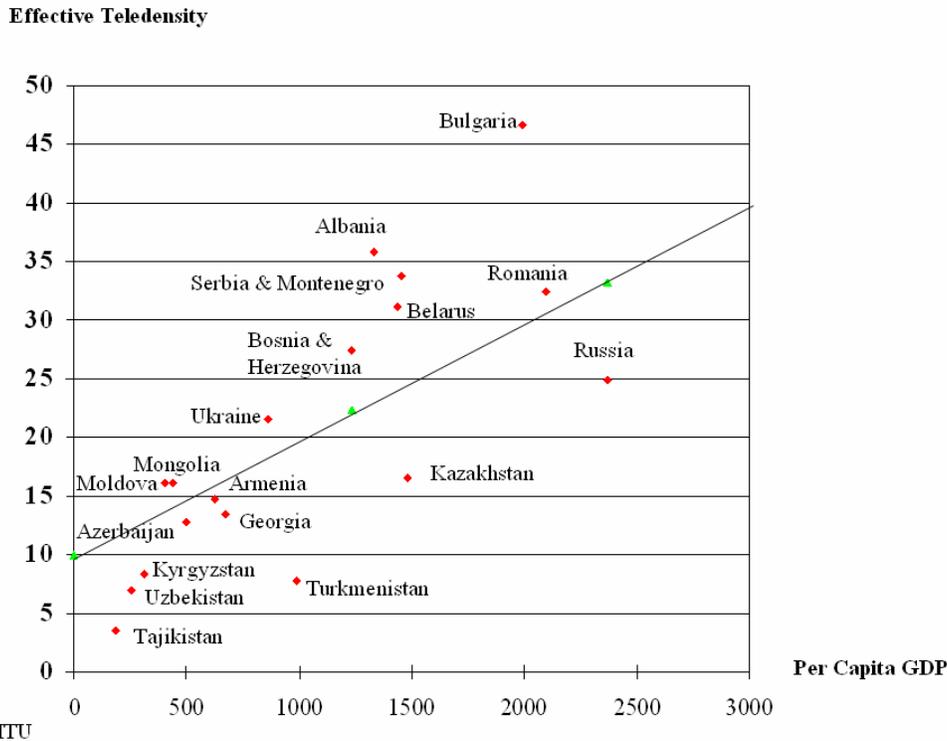


Figure 2.1 Correlation between Effective Teledensity and GDP per capita

For these reasons it is becoming usual for bodies such as the ITU (International Telecommunications Union) to measure basic level ICT development (telecommunications) in terms of ‘effective’ teledensity, meaning the number of fixed or mobile lines (which ever is the greater) per 100 of the population. Figure 2.1 shows the commonly observed correlation between ‘effective’ teledensity and GDP per capita using the countries selected above. Of the Central Asian countries, only Mongolia rises above the average for the whole group of countries for their respective levels of per capita income. The others, including Turkmenistan,⁸ all perform poorly compared with countries of a similar per capita GDP, such as Azerbaijan, Moldova, Georgia, and the

connected by trunk or backbone networks, often using optical fibre or microwave for heavy duty high speed connections. Third, traffic is routed through tandem exchanges for national long distance transmission and through international gateways (cable or satellite) for incoming and outgoing traffic. Finally, the most expensive part of the network is the local loop connecting local exchanges to the premises of local customers. This can be done using a variety of technologies: copper twisted pairs, coaxial cable, fibre to the building, Vsat (very small aperture terminals to pick up satellite signals), two-way radio and fixed wireless access. Mobile cellular networks use their own mobile switching centres (MSCs) and an array of cell sites served by a base station in each to provide ‘handoff’ between cells. These networks also require backbone or trunk networks to haul traffic over long distances and to interconnect with the PSTN.

⁸ Afghanistan is excluded from the graph because most of its telecoms network was destroyed.

Ukraine. Kazakhstan compares poorly with Albania, Belarus, Bosnia Herzegovina and Serbia & Montenegro, and they all fall to the bottom of their respective per capital GDP teledensity ratios compared with other ex-Soviet countries.⁹ Why?

2.2 A Question of Geography?

The question is more easily answered in the negative: it does not appear to be because the other countries have more competitive markets. All these economies have been struggling with the same issues of transition and adjustment. In most of them the PSTN is either a state-run monopoly, for example Belarus, or the dominant operator, but in all of them the mobile sector and Internet services have been opened to competition and the State is following similar steps of preparing for further liberalization, the adoption of necessary laws and regulation and the pursuit of e-Government, e-education, e-health, and so forth. In all cases a similar set of international donors has been actively aiding and encouraging this process, led by the European Bank for Reconstruction and Development (EBRD) and supported by the World Bank and agencies such as the UNDP and the UNECE, USAID, the Soros Foundation, and so on. Furthermore, several of these countries have been riven with internal conflicts and destructive civil wars. The only factor that seems to separate them is geography.¹⁰ The Central Asian countries are far removed from the European centres of capital and commerce in Western and Central Europe and their level of interaction is therefore reduced. Access to Western markets for East European goods, capital and labour has been a source of revenue and stability not generally available to Central Asia.¹¹ Kazakhstan and Mongolia have been the closest by proxy due to their borders with Russia, and alongside Russia, Kazakhstan stands out as a trade route between Europe and Asia.¹²

2.3 A Question of Trade?

This relative geographical isolation will persist until transport and telecommunication links are greatly improved. One stumbling block has been the failure of the idea of a CIS Free Trade Area to emerge, despite an Agreement signed in 1994 by all CIS countries except Turkmenistan. The Russian Parliament failed to ratify the Agreement. Instead a series of bilateral Free Trade Agreements have been reached led by the three largest trading economies, Russia, the Ukraine and Kazakhstan, each imposing their own set of exemptions. Appendix 2 summarizes these FTAs across twelve countries. Kazakhstan has none with three of the twelve, the Kyrgyz Republic none with five, Uzbekistan none with six and Tajikistan none with seven. Between the four countries, Kazakhstan has FTAs

⁹ The Czech Republic, Hungary, Slovakia and Slovenia do not appear on the chart because their levels of teledensity rise off the scale. The same would be true of the Baltic states, Croatia and Poland.

¹⁰ Culture is another possible candidate, but this ignores close ties with Western Asian countries such as Turkey and Iran, and with European countries such as Germany and, of course, Russia.

¹¹ The South Caucasus countries Armenia and Azerbaijan are also relatively isolated and Graph 1 suggests their combined teledensity performance is only marginally better than Central Asia.

¹² 'Geographically, Russia and Kazakhstan connect other countries in the region with Europe and the Far East. Also, due to their large economic size and economies of scale, Russia and Kazakhstan (for Central Asia) serve as regional distribution centers that service the smaller economies of the region.' Lev Freinkman et al. (2004) *Trade Performance and Regional Integration of the CIS Countries*, The World Bank http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2004/08/17/000090341_20040817155733/Rendred/PDF/297910PAPER00182131589610.pdf

with Kyrgyzstan and Tajikistan (both with exemptions), Kyrgyzstan with Kazakhstan and Uzbekistan, Tajikistan with Kazakhstan only, and Uzbekistan with Kyrgyzstan only. As only the Kyrgyz Republic and Mongolia are so far members of the WTO, it is also impossible for each of these countries to harmonize their import tariff structures across the CIS countries, although their average import duties tend to be rather moderate - in 2002 they averaged just over 10 per cent *ad valorem* across Kazakhstan, the Kyrgyz Republic, Tajikistan and Uzbekistan according to the IMF.

But as a 2003 UNDP study of business sector investment in Kyrgyzstan found (see Country Profiles below) there is considerable private sector concern over the way in which duties and taxes are applied in practice. For example, 2000 witnessed a Decision of the CIS Government Heads on the Rules of the Determination of a Country of Origin of Goods. The duties on goods with certificates of origin apply to the full cumulative value of the goods produced within the CIS trading area, whether produced within FTA countries or not and in theory this should lessen the motivation to disguise the true origin of the goods. However the World Bank paper of Freinkman et al. (2004) argues the evidence – a significant and unexplained non-matching of the declared value of exports and imports between pairs of CIS trading partners – suggests otherwise.¹³ Another example raised by Freinkman et al. (2004) arises in the area of standards setting with the CIS mutual recognition agreement (‘Agreement on Mutual Policies in the Area of Standards, Metrology, and Certification’) signed in 1992 and the 2000 Protocol on amendments to that agreement. Slowly old Soviet era standards are being replaced by ISO and European recognized standards,¹⁴ but: ‘Anecdotal evidence suggests that border officers abuse their responsibilities and extract bribes for the confirmation of certificates of conformity.’ (p.49).

The Central Asian economies are by and large importers not exporters of ICTs, and although the level of ICT trade remains low due to the level of ICT development within these countries, any impediments, risks and uncertainties attached to bringing in telecommunications, broadcasting or computer and networking equipment or software is bound to impede local development and investment. This has been recognized by several of the five Central Asian countries (see Country Profiles) who have introduced exemptions or reduced tariffs on ICT imports, but it is important that the customs regime implements these policies in a transparent manner.¹⁵

2.4 Models of Economic Growth?

¹³ ‘However, after transit through Russia or Kazakhstan, goods face a risk of misspecification of the country of origin. There is powerful incentive for such misspecification, since Russia exports enjoy duty-free access to the CIS markets (in instances where the bribes offered for forging the certificate of origin are lower than the applied tariff rate.)’ p.5

¹⁴ CIS ministers and regulators do meet regularly as members of the Regional Communication Union (RCU) Electrical Communication Operators’ Council and Electrical Communication Commission mainly to discuss tariffing policy and settlements between operators.

¹⁵ Both Mongolia and Uzbekistan have exempted ICT hardware imports, the Kazakhstan has done selectively, the Kyrgyz Republic has recently announced exemptions, but in Tajikistan exemptions have been resisted by the Finance Ministry.

It is evident that the Central Asian economies face a slow uphill task to raise the level of their economic development in light of their geographical isolation and the relatively small size of their economies. In two cases, Kazakhstan and Uzbekistan, the countries have natural deposits of valuable raw materials, notably oil, natural gas and gold, but generally each of these economies has to build up slowly and steadily from a small but productive base. Inter-regional cooperation would certainly help, especially the easing of trade and transport restrictions between them, but for the moment progress on that front seems hampered due to political considerations. Also, from the supply side there may not be too many synergies except perhaps in energy and water. On the demand side, bringing down trade barriers would make all these markets more attractive to potential investors in any one of them. Evidence from international ICT companies such as Microsoft, IBM and Fujitsu suggests they are all attracted to the growth of e-government and e-community projects in the five countries and see potential growth in the private sector, for example, among textile manufacturers and food processors, among banks and the services sector, and even among SMEs.¹⁶

But is the ‘slow steady pace of growth’ scenario the only one available? Each of the governments has plans at various degrees of readiness to build IT Parks and Special Economic Zones (SEZs) after the fashion of China. The furthest advanced are those in Kazakhstan where an ICT park outside Almaty is planned and MOUs with a number of international ICT companies have been signed. MOUs cost nothing, but translating them into action can cost a very large slice of a nation’s scarce resources. Tax breaks and zero customs duties may not be sufficient to offset geographical isolation, high transportation costs and lack of a local market, especially when there are many developing economies offering similar packages. Small economies are usually users rather than developers of ICTs, and the scale of ICT production that can thrive in small markets usually involves small clusters of companies with very low sunk costs, for example, developers of local content for mobile phones, or animation for local Web servers or TV. IT Parks are normally closely associated with a plentiful supply of local graduates and nearby research institutes and universities. Great caution needs to be used before a commitment of scarce resources, as well as organized research and consultations with ICT companies who are all too willing to sign MOUs.

2.5 Project Management Skills Needed and Need to Be Championed

This is, in effect, a plea for a high degree of professionalism in the management of projects. Project management skills can be taught, but there is no substitute for on-the-job learning, and this is perhaps the most important human resource capacity that is required for turning policies into practical investment programmes. All the Central Asian economies are at the stage where they have established many excellent policies on paper, created the right legal environments, for example, passed laws on e-signatures and data protection and the liberalization of the telecommunications market, and set aims and

¹⁶ During 2004 Fujitsu recorded 62 per cent growth in the region, over half in Uzbekistan and estimated the Kazakh market was growing by 20 per cent per annum. Microsoft reported sales in Kazakhstan doubled despite software piracy after it came out with a version that can switch from Russian to Kazakh, and is opening a representative office in Uzbekistan where it has four certified dealers. IBM is also opening an office in Tashkent.

targets for ICT development, and now need to find ways to implement them. Often driving the timetable of legislative reform has been the desire to become a candidate for WTO membership, so for example, under the WTO Basic Agreement on Telecommunications the Reference Paper sets the guideline to establish an independent regulator. The Reference Paper is a 'best practice' outline, but the reality in the Central Asian countries is that not even in the most 'independent' case, for example Mongolia, is the regulator given a genuinely free hand and the resources to do the job. Nor do any of the regulators have websites that provide details of licences and frequency assignments, consultation papers, etc., as is 'best practice' in more developed economies. The reason is not a resource issue as such, but a governance issue. Transitional economies take time to change their legal structures, their cultures, their civil service management and career structures, and so on. It would therefore be far more productive to direct resources at the implementation level and allow regulators to gather more professional capacity and develop transparency than to focus in the short term on the ideal regulatory structures. Professional capacity and transparency should be achievable short term goals.

Interviews for the Country Profiles revealed that all too often Government policies and actions are not known about even within the industry. This may be in part a legacy of the culture of closed government, and it may be in part the absence of any effective cross-agency coordinating mechanism to inform other departments of government and the public. E-government is supposed to address these types of issues and e-government is still in its early stages, but while ICTs are tools to assist this process, the process itself is one of management, organization and human initiative and not one of technology as such. The adoption of ICTs is simple enough, and new PCs can stand idle forever, but the effective usage of ICTs in ways that add value to the process of work and for those engaged in work calls for changes in mindsets. Since human management enshrines a mindset, changing it is often a major challenge to those in authority and is regarded as a threat by them. Handling this process is again an issue of project management, but it can only happen if there is a champion with the authority to make it happen. This is why it is so important that the Central Asian countries appoint the most senior of Government officials to take personal responsibility for the national ICT policy making and coordinating bodies, and to prioritize project management skills as a step towards good governance and the effective use of scarce resources.

2.6 ICTs, the Economy and Investment

The structures of the ex-Soviet economies differ markedly, although they share the common heritage of having become specialists in an enormous supply-chain centred on Russia. Among the many other adjustments this has meant having to diversify or replace import and export markets.¹⁷ In some economies, for example the Czech Republic and Slovakia, advanced precision manufacturing was well established, industries that can easily take advantage of ICTs to raise their productivity and extend their product range. The Central Asian economies are less well positioned in this regard, although the use of ICTs in the administration side of their industries, such as in the oil and natural gas

¹⁷ The share of inter-republic exports in total exports between 1985 and 2001 fell as follows: Kazakhstan 90%-24%; Kyrgyz Republic 98%-48%; Tajikistan 86%-32%; Uzbekistan 84%-33%. See Lev Freinkman et al. (2004) *Trade Performance and Regional Integration of the CIS Counties*, The World Bank, p.32.

industries, in cotton and other crop production, in gold mining and so on, is a natural development. Kazakhstan, for example, is pioneering its own software for specialized mining work, thereby trying to develop a competitive advantage based upon its expertise, and maybe Kyrgyzstan can draw upon its history as a specialist in IT production for the Soviet military. But the reality is that the markets for ICTs in these five economies remain small and underdeveloped. Even radio and television, the mostly widely adopted ICTs in the world, are not available to all citizens due to the remoteness of some villages and mountainous terrain. The fastest growing items are mobile phones, and this is the sector that attracts the most foreign capital, mainly from Russia as the Country Profiles make clear. Chinese capital is also beginning to appear, while investment from the Republic of Korea, especially in Mongolia and for a time in Uzbekistan, was prominent. But this is relatively small scale investment since it does not cost much to set up a wireless network, although there is some evidence of these operators preparing their businesses to move into wireless broadband access in the cities as and when they are permitted by local regulations to do so.

One very important source of funding for ICT development and access has been donor finance. This is referenced time and again in the Country Profiles. It has been largely driven by the World Bank and the European Bank for Reconstruction and Development (EBRD) and supported by many other multilateral and country IDAs, UN agencies, Exim banks and international NGOs, each tasked to support national economies in transition and to assist in the development of poverty reduction programmes. No attempt here is made to estimate the sum total of aid, grants and loans, but it becomes evident from the Country Profiles that the donor priorities tend to be the same in the Central Asian republics. At state level they have been heavily focused on capacity building for good governance, especially in the collection and disbursement of state revenues, and e-government has been mainstreamed as part of these programmes. They have also focused upon inclusive development to the extent of assisting school projects and computers in schools, community projects including e-community portals, ICT training programmes, e-health projects, etc. UN agencies and international NGOs have been especially active at the community level, mainstreaming gender issues among others.

But even IDAs are subject to the fashions and passions of the age. A lot of emphasis on governance has been focused upon the legislative process, for example getting laws on e-government, e-signatures, e-commerce, e-security, IPRs, data protection, and so forth in place. All this is worthwhile and in the long run necessary, and given the legacy of Soviet legal systems probably unavoidable,¹⁸ but there is a substantial reality gap between the vision of an electronic economy, polity and society and the level of ICT development in the Central Asian countries. This is an example of ‘best practice’ when ‘good practice’ would perhaps be more appropriate in the short term. The financial and human and organizational resources that have gone into ‘normative laws’ and policy statements,

¹⁸ The ex-Soviet legal system has a hierarchy of administrative laws, starting with normative expressions of aims and objectives, and descending through laws that enshrine the policy aims to decrees and regulations that specify particular administrative aspects of implementation. Any major changes inevitably involve a lengthy search through decades of accumulated legal instruments which all need to be brought into line, a process that can delay the implementation of policy for many years.

plans, aims and objectives may well have found a faster return on investment had they been devoted to two other areas: implementation and project management skills development. It is true that without the institutions of government in place, for example without a proper regulatory authority to open up the telecommunications market to competition and safeguard against monopoly pricing by the incumbent, not much progress can take place, but using this example it would be more productive to add resources to the regulatory function, including the capacity to introduce transparent licensing procedures and spectrum management, than to devote several years to ensuring that every piece of legislation is correctly aligned before opening of the market.¹⁹ There is a tremendous shortage of capital investment in the telecommunications infrastructure as the Country Profiles reveal, and many private sector companies are only too willing to invest in mobile networks, radio and TV stations and the fixed wireless broadband markets in the major cities, and are prevented from doing so due to the slow procedures of implementing the policies of transition.

III. ICTs, Development, Gender and Poverty Reduction

The widespread diffusion of computers and of networked computers in particular among enterprises in the 1990s in the developed countries of the OECD at first failed to show up in the productivity data, giving rise to the 'productivity paradox'.²⁰ Various theories were put forward to explain this, including the view that the gains were not appearing in company profits but in lower prices for consumer and in lower underlying inflation. By the turn of the twenty-first century there was no longer any doubt that higher productivity was at last showing through in the overall economic performance of these economies. For example, annual labour productivity growth in the USA 2000-02 averaged 3.5 per cent compared with 2.5 per cent 1995-2001, and a similar story can be told for economies such as Ireland, Netherlands, Australia, Denmark and Great Britain. But for ex-Soviet economies, either the data hardly exists or ICTs hardly exist. According to Piatkowski (2004) 'There is however hardly any evidence for the impact of ICT on developing and emerging economies, including the post-communist countries transitioning from a centrally planned to a market economy' and in his econometric study of the impact of ICTs on growth in four ex-Soviet economies, Piatkowski finds that in *absolute* terms the impact was higher in the Czech Republic and Hungary than in Poland and Slovakia, and in *relative* terms higher in the Czech Republic and Hungary than in the EU and the USA. One of his conclusions: 'It seems that the size of FDI inflows to the ICT sector has been the main driver of the difference in the value of ICT production among CEE countries.'²¹

¹⁹ For example, Uzbekistan passed a normative law in 1996 for the establishment of free economic zones, yet none had been established by 2005 because of lack of supporting legislation.

²⁰ In reference to the noble laureate economist Robert Solow's famous observation 'that we see computers everywhere except in the productivity statistics.' See <http://www.neweconomyindex.org/productivity.html> Also UNCTAD (2003) *E-commerce and Development Report*, p.42 http://www.unctad.org/en/docs/ecdr2003_en.pdf

²¹ Marcin Piatkowski (2004) 'The Impact of ICT on Growth in Transition Economies', TIGER Working Paper Series, Warsaw, July. See <http://topics.developmentgateway.org> . Most ICT production in the CEE countries consists of consumer electronics products rather than semiconductors and computers.

Piatkowski finds foreign direct investment to be the important driver of ICT production and ICTs contribution to GDP growth.²² In the Central Asian economies, as the Country Profiles make clear, FDI is a trickle and mostly Russia rather than global capital into the rapidly growing mobile cellular phone sector. Does this imply the low-income landlocked Central Asian countries with high transportation costs and poor communications are in a 'poverty trap'? It is worth noting another of Piatkowski's conclusions. Using a measure he names the 'New Economy Indicator' that compares levels of economic, institutional and regulatory frameworks, he finds

The 'NEI' ranking confirms that in the five leading CEE countries, where ICT has had the largest contribution to growth, the level of development and quality of economic and institutional infrastructure was considerably higher than in the remaining three CEE countries (Bulgaria, Romania and Russia). A relatively strong correlation (0.46) between the value of the 'NEI' and the average contribution of capital to labour productivity growth between 1995-2001 provides evidence that the economic, institutional and regulatory factors have a large bearing on the use of ICT. It can then be argued that a continuous improvement in the quality of institutions and regulations, increase in trade openness and macroeconomic stability, enhanced labour and product market competition as well as the size of outlays on human capital and R&D are prerequisites to absorption and productive use of ICT in order to shorten the distance in level of development relative to the EU countries. (p25).

The Central Asian CIS economies start from an even less developed state than most of the CEE countries, and the gap they have to close, or the 'distance' they have to shorten is considerably greater. Goals must be set realistically, but the important thing is that whatever steps are taken to reform the economic, institutional and regulatory institutions are implemented as professionally, as efficiently and as effectively as possible. Relative to GDP the incremental improvements can be significant and will send the right signals to foreign investors.²³ This theme is taken up in greater detail in the next section dealing with the conceptual model.

3.1 Poverty Reduction

The most important direct link between ICTs and poverty reduction is probably job creation. Since ICTs are an efficient and effective means of performing many intermediate tasks, from using spreadsheets for accounting and stock control to computer-controlled machinery, as well as a means of e-commerce, that is the delivery of goods and services, especially over the Internet, the demand for ICTs will grow exponentially, and so will jobs requiring ICT skills and knowledge. Within policy frameworks the emphasis is usually on the use of the Internet to deliver online education, health and a

²² Williams finds a positive correlation between the growth rate of mobile phones and FDI in developing countries in Africa and confirms the finds of Reynolds et al. that fixed line infrastructure is positively related to FDI. See 'Africa: The Impact of Mobile Phones' Vodafone Policy Paper Series, No.2, March 2002, http://www.sarpn.org.za/documents/d0001181/P1309-Vodafone_March2005.pdf

²³ Like learning to walk, the first steps are small and are the most difficult to achieve, but they are fundamental to all future progress.

range of welfare and environmental services to help ‘empower’ people and thereby reduce poverty and its effects.

There is a chicken-and-egg side to all this. Poverty deters private investment if it is read as a signal of no market. Purely statist approaches to poverty reduction tend to reinforce this view. What the experience of countries like the Philippines has shown is that when private market solutions are encouraged alongside state initiatives, hidden effective demand is revealed. Mobile cellular companies like Globe and Smart discovered that by introducing the cheap pre-paid card it suddenly became profitable to serve villages beyond the cities. Poor people chose to use the cheaper short message service (SMS) rather than the more expensive phone call to communicate, and this prompted the cellular companies to innovate by allowing townsfolk to transfer small sums of money to the cards of their relatives and friends in the countryside through the cellular networks. The state-led effort to increase investment in fixed lines by making it a requirement of the licences regime was completely overtaken by this dramatic and unforeseen growth in pre-paid cellular services. So the lesson is that there are many ways to reduce poverty, but to be sustainable they all involve stimulating investment, job creation and ensuring that poor people have equal access to these opportunities.

3.2 Gender

‘we’ve anecdotally known that 70% of the poor are women.’²⁴

With the collapse of the Soviet system came the closure of large parts of the formal economy when the Soviet-wide supply chains they were part of disappeared, pushing millions of people into an informal economy that could be between 50 -80 per cent of GDP, undermining efforts to reduce poverty. Men and women suffered in similar proportions and for that reason a 2003 World Bank study, *Gender in Transition*, found no significant deterioration of the position of women *relative* to men during the period of transition.²⁵ By contrast the 2005 UNIFEM study found a significant *absolute* deterioration in the position of women.²⁶ Structurally, poverty becomes institutionalized through the insecurity of having to rely upon the informal economy and by the loss of social protection from the state such as housing, education and social welfare support. It is often women within the family who have to bear the extra burden of the shift in nurturing and caring required, for example looking after elderly relatives or coping with sick children, as well as having to find money-earning opportunities in the informal sector.²⁷ To dig themselves out of poverty people need access to opportunities. If they are entrepreneurs they need lines of credit to support SME initiatives, but for most people

²⁴ Nancy Spence, Commonwealth Secretariat, *A Dialogue on ICTs and Poverty: The Harvard Forum*, September 2003, IDRC Seminar http://web.idrc.ca/es/ev-46873-201-1-DO_TOPIC.html

²⁵ <http://lnweb18.worldbank.org/ECA/eca.nsf/0/F55E7337BA69423985256BFA0053F091?OpenDocument>

²⁶ UN Development Fund for Women (2005) *Progress of the World's Women: Women, Work, Poverty*. http://www.unifem.org/attachments/products/PoWW2005_eng.pdf

²⁷ ITU (2004) *Trends and Status of Gender Perspectives in ICT Sector: Case Studies in Asia-Pacific Countries: Final Report* identifies issues critical to women using ICTs as: access and know-how, industry and labour, content and language, power and decision-making, security and privacy, socio-cultural barriers. See http://www.itu.int/ITU-D/asp/Publications/GenderPerspectives_in_ICTASP-Region.pdf

first and foremost they need job opportunities and access to the skills and knowledge that the new jobs demand.

High on the list of priorities is the opportunity to access education and training in ICTs, but there are no comprehensive statistics on this issue. There is data on access to primary, secondary and tertiary education from the World Bank's database and UNESCO.²⁸ In terms of ratios, Tajikistan stands out as having an alarming drop in the percentage of females in each age group entering education as a ratio of the percentage of males in each age group. The data becomes more alarming when the percentages themselves are observed. The percentage of females entering tertiary education in Tajikistan, 1990-2000, fell from 17 per cent to 7 per cent and in Kazakhstan from 44 per cent to 36 per cent.²⁹ But the Kyrgyz Republic saw an increase from 15 per cent to 42 per cent, as did Mongolia from 18 per cent to 42 per cent.

Table 3.1 Ratio of percentage of age group of females to males enrolled in education

Country	Ratio of % of age group of females: males enrolled in education					
	Primary		Secondary		Tertiary	
	1990	2000	1990	2000	1990	2000
Kazakhstan	0.98	0.98	1.02	0.97	1.22	1.20
Kyrgyzstan	1.00	0.97	1.02	1.01	1.15	1.05
Mongolia	1.02	1.04	1.14	1.2	1.8	1.75
Tajikistan	0.97	0.92	1.00	0.82	0.62	0.33
Uzbekistan	0.98	0.99	0.91	0.97	1.10	1.11 (1995)

But analysis of ICT4D should not focus only on seeing women as a disadvantaged group who require or deserve special training and help in ICTs, however true in particular cases that may be. On its own such a focus loses sight of the centrally important role of gender in ICT4D and in poverty reduction programmes, the role of women as *agents* of development, not simply as *recipients* of the benefits of development. The 2001 APDIP *Essentials* evaluation paper provides an example of telecentres, pointing out, 'evidence from a number of telecentre evaluations underlines that women's use of ICTs is increased when women are managing or teaching in the centres.'³⁰

One of the problems in Central Asian countries is the legacy of Soviet times when state policies were often very enlightened but *independent* women's civil organizations were not encouraged or positively discouraged. Hence, a 2002 ESCAP report on gender issues in CEE/CIS countries stresses the importance of women's advocacy groups for awareness raising and sparking an interest in ICT and gender research and policy-making. 'For CEE/CIS the successful incorporation of gender into ICTs is hampered by the lack of a

²⁸ Search <http://devdata.worldbank.org/genderstats>

²⁹ This means, for example, that in 2000 only 7 per cent of females of tertiary education age went into tertiary education compared with 21 per cent of males.

³⁰ APDIP (2001) *Essentials: ICT4 for Development – Synthesis of Lessons Learned* <http://www.apdip.net/documents/policy/actionplans/Essentials05092001.pdf> See also the Grameen Phone example cited later in this paper.

strong driving force - advocacy actions arising from a strong women's movement - which would stimulate more research and lead to increased interest in gender by institutions responsible for ICT policies and in ICTs by the state machineries for gender equality.³¹

The theme is echoed in a 2004 UNDP report. 'Most countries in the region have developed or are in the process of developing National Action Plans for Information Society Policies, which are paramount for guiding national ICT for development (ICT4D) processes. These plans, however, largely exclude a gender perspective. Women in the CEE/CIS region have generally been preoccupied with traditional topics related to women's rights such as domestic violence, trafficking, gender equality legislation, reproductive health, etc. Awareness of information society policies or the relevance of gender to ICTs remains limited and, in conjunction with other regions, advocates from the CEE/CIS have not been engaged in global gender and ICT networks. Consequently, sensitization to the importance of integrating gender within ICT policies faces challenges.' (p.xi)³²

Box 3.1 Findings of the 2004 UNDP's Bridging the Gender Digital Divide

- Women are underrepresented at all levels of ICT initiatives in the CEE/CIS and the integration of gender and/or women-specific issues is limited;
- CEE/CIS is largely absent from global gender and ICT debates and forums;
- Gender equality advocates are uninformed about the importance and relevance of ICTD to the gender equality agenda;
- Access and training opportunities to acquire basic skills are insufficient for advancing women's equal access and participation in the ICT sector;
- Increasing women's involvement in developing online content that responds to their needs and priorities deserves increased attention;
- Young women have greater opportunities to participate in ICT activities and environments, than do older women who deserve further encouragement and support;
- A critical starting point for achieving gender balance in the ICT sector is tertiary level education

Recommendations

- Increased support for gender and ICT advocates from the region to advance gender mainstreaming within ICT policies and programmes;
- Support for stronger involvement of women and women's organizations from the region in the WSIS process leading to the Tunis Summit in 2005
- Further research to determine the status of women in the ICT sector and the gender impact of ICT policy development;
- Specific measures to strengthen gender within ICT projects at various phases, including the planning, implementation and evaluation; and
- Capacity building for ICT project personnel on gender and its relevance to ICTs.

³¹ UN ESCAP (2002) *Issues, Policies and Outcomes: Are ICT Policies Addressing Gender Equality?* (pp.7-8) <http://www.unescap.org/esid/GAD/Publication/Issues.pdf>

³² UNDP (2004) *Bridging the Gender Digital Divide: A Report on Gender and ICT in Central and Eastern Europe and the CIS*; http://www.unifem.org/attachments/products/BridgingGenderDigitalDivide_eng.pdf

The report underscores the lack of data which ‘is a fundamental constraint for evaluating the gender impact of ICTs and women’s position in the ICT sector within CEE/CIS.’³³

Despite the difficulties facing women’s organizations to establish themselves and exert an influence, a 2001 ESCAP assessment of *Women’s Organizations and Their Use of ICTs in the Caucasus and Central Asia Region*³⁴ did find plenty of evidence of both autonomous and state-assisted women’s NGOs. In Kazakhstan there were more than 100, although less than one-third had email addresses or regular access to the Internet. In the Kyrgyz Republic 268 out of 1,408 recorded NGOs were women’s groups, in Tajikistan 21 out of 300, and in Uzbekistan 35 out of 465. The report also draws attention to the ambiguity of legislation regarding the status of NGOs, arguing that it did not ‘distinguish between NGOs and political parties, trade unions, agricultural cooperatives and religious organizations. Most importantly, the law did not distinguish between public benefit NGOs and mutual benefit NGOs, membership and non-membership NGOs, charity and developmental NGOs.’ (pp.50-51). This is an area of reform that would certainly help, not least in terms of funding and tax relief on donations.

IV. The Conceptual Model

ICT development can refer to different things. These range from (i) the manufacturing of components and products and/or the writing of software programmes and/or the use of software programmes to develop content and applications; (ii) the widespread adoption or 'diffusion' of ICTs throughout the economy and society; (iii) the creation of value through ICT services, such as telecommunications. In the case of the five Central Asian economies there is very little of (i) while (ii) remains largely confined to the private sector, to government agencies, international organizations and donor-funded, NGOs funded, to some schools, hospitals and community centres and to a growing number of Internet cafes. Only (iii) the spread of ICT services, especially mobile telecommunications, is currently showing strong growth and attracting some foreign, mostly Russian or in Mongolia Japanese and Korea, investment. However the spread of computing and computer networking is slowly gathering pace in both state and private commercial sectors, growing it seems at between 50 and 100 per cent per annum but from a small base.

4.1 Model One: Stratification

One way to conceptualize the diffusion of ICTs is by stratification, as shown below. Where the state has resources, the public sector can take the lead if that is the policy preference and judgment of planners. This seems particularly the model in Kazakhstan and Uzbekistan. Where the state is far weaker financially, as in Tajikistan, the private

³³ In this regard the report welcomes the UNECE Statistical Division’s initiative to include gender statistics in its future assessment of ICT development as ‘an important contribution towards beginning to address this gap, and it is hoped that the assessment results will serve as a starting point for National Statistics Offices to improve data collection and to develop gender-sensitive data and indicators for this area.’ (p.xi)

³⁴ UN ESCAP (2001) *Women’s Organizations and Their Use of ICTs in the Caucasus and Central Asia Region: An exploratory Assessment*, <http://www.unescap.org/esid/GAD/Issues/ICT/Women&ICT-Pub.pdf>



Figure 4.1 Diffusion of ICTs

sector is relatively more active in driving ICT adoption almost by default. Kyrgyzstan and Mongolia fall somewhere between the two ends of this spectrum, the state attempting to play an active role, yet recognizing the lead role of the private sector. The role of donors has been mainly at the public sector and community sector levels, with international NGOs and local NGOs especially focused on the community level. Local NGOs, sometimes with donor support, have also been active in the private sector along with local industry associations, and in some cases they are being invited to participate in the ICT policy making bodies, for example in Mongolia and Tajikistan, or are active in organizing national ICT awareness raising events with government support, for example in Kyrgyzstan - see Country Profiles. As useful future exercise would be to trace the feedback loops between these sectors, especially in terms of the sustainability of ICT development projects such as community centres and telecentres which need diversified sources of income to survive long term.

4.2 Model Two: The Dynamic Virtuous Cycle

There is a widely observed interplay between the triad of policy and regulation, technology and markets which is outlined by Ure (2004) for the World Bank.³⁵ Between them they create a dynamic relationship and the key to successful national ICT development for low income countries and economies in transition is for policy-making to slip into first gear to drive this virtuous cycle. The reason why this triad is important is that centrally-planned economies traditionally relied upon state-led investments and plan quotas, yet ICT development, especially IP-related ICT development, has been characterized by a rapid pace of technological innovation and obsolescence and equally rapidly evolving and changing business models. Risk and uncertainty and a major gap between the total cost of acquisition (TCA) and the total cost of ownership (TCO) have replaced the older models based upon long-term investments with known returns and lengthy periods of equipment depreciation based on predictable engineering plans, and market forecasting derived from the relative certainties of the economy's spatial growth. The new global world of ICT development is not an appropriate environment for

³⁵ See *The Way Forward: Telecom Note* at http://www.trp.hku.hk/publications/telecom_note040721.pdf or http://lnweb18.worldbank.org/eap/eap.nsf/Attachments/background+11/USDFile/TelecomNote_Final_210704.pdf

governments to lead the market. Yet the spending powers as well as the policy-making authority of governments are vital to kick-start the process in countries where much of the basic infrastructure is still missing.

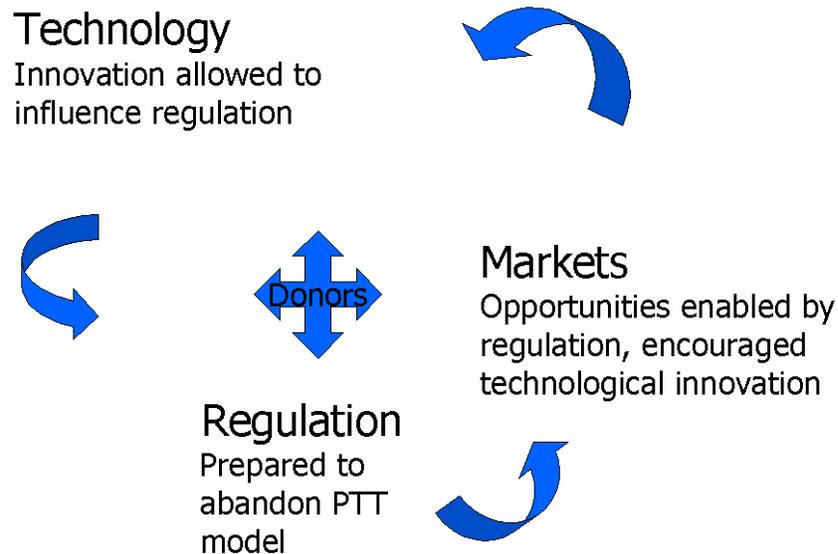


Figure 4.2 The Dynamic Virtuous Cycle

In the case of the Central Asian economies there is one additional factor that is proving vital to the early development of ICTs, the role of donors, and their role has been implanted into the centre of the model. This high level model identifies changing technologies, such as voice-over-IP (VoIP) and broadband wireless access (BWA) and mobile cellular telephony, as posing challenges to existing policies and regulations which have to be changed to accommodate the new opportunities which by and large are to be taken up by private sector markets. Donor assistance can be crucial to the ability of governments, community organizations and the private sector (for example, EBRD equity and lines of credit to KarTel in Kazakhstan, and KfW and ADB in Mongolia's national backbone network) to acquire ICTs.

The following four diagrams delve down a little deeper into the contributions of the three generic components, technologies, policy and regulation, and markets and their combined effects. In each case the positive effects on investment are suggested. The models can be used locally to identify the real effects and by implication both the *level* of development and the *effective development dynamic*.

Policy and Regulatory Effects

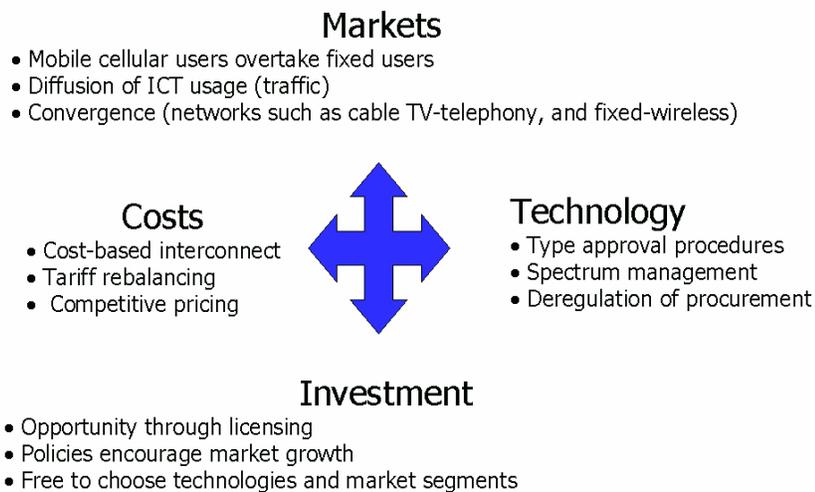


Figure 4.3 Policy and Regulatory Effects

Technology Effects

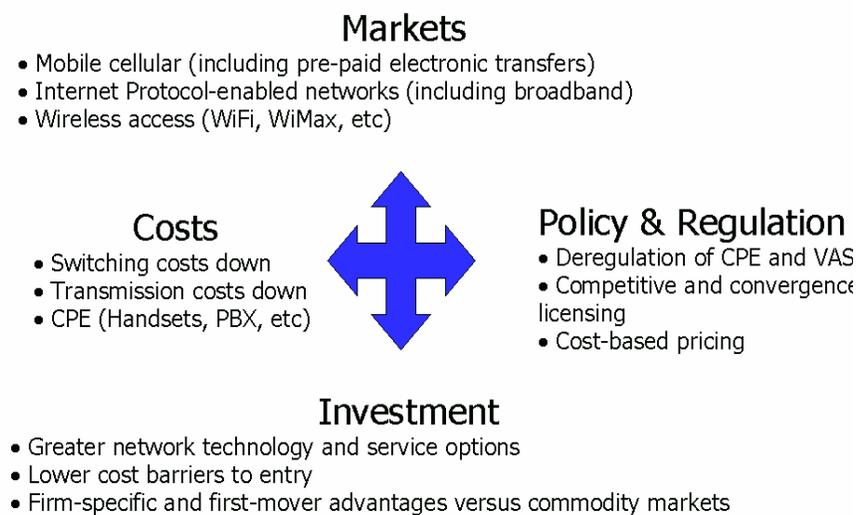


Figure 4.4 Technology Effects

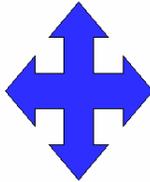
Market Effects

Policy and Regulation

- Pro-consumer, pro-competitive policies
- Telecoms seen a trade and investment issue
- Universal access and ICT promotion-specific policies

Costs

- By-pass and arbitrage of traditional tariff structures
- Flat-rate, Ramsey and other pricing models
- Elasticity and investment



Technology

- New technology diffusion tested and accelerated
- IP-based and e-technologies
- Technology convergence

Investment

- High returns on investment
- Exit strategies if market is buoyant
- Eases access to finance

20

Figure 4.5 Market Effects

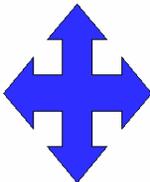
Combined Effects

Access

- Faster growth of the private sector increases attraction of commercially incremental service areas (eg, pre-paid mobile cellular services; WLL)
- Releases and adds to public sector resources for devoting to access
- Public policy can focus on ICT diffusion

Costs

- Incrementally efficient
- Transparent or revealed through incentive mechanisms
- Wholesale/retail competition regulation watchdog required



Revenues

- Revenue models uncertain
- Commodity level prices will drive convergence to gain traffic
- Product and service substitution is likely to grow

Investment

- Incumbent fixed line carriers either (a) as low-cost competitive oligopolies rather than inefficient monopolies, or (b) broadband innovators
- Mobile cellular operators likely to consolidate, maybe convergence with fixed, with higher returns for scale and scope (eg. 3G applications)
- Investors looking for regional/global synergies and require ownership

Figure 4.6 Combined Effects

Where do the Central Asian economies stand in relation to this model? Each country profile has been organized to relate to these category headings.

4.3 Policy and Regulation Effects

At the policy and regulatory level, it is evident that all the countries have acknowledged in policy statements and in laws the need to move towards this model, but the implementation process is slow and uncertain, so the policy and regulatory effects on markets (see above) have hardly begun to make themselves felt. For example, mobile users have not yet reached fixed line numbers in Uzbekistan, are close but not quite there in Kyrgyzstan and Tajikistan, but are well ahead in Kazakhstan and Mongolia. Cost-based interconnection charges have yet to be introduced, tariff rebalancing has progressed only slowly and pricing is often controlled. The effects on technology are rather minimal, for example spectrum management remains opaque, although in some cases policy has encouraged leapfrogging, for example Tajikistan has introduced UMTS (3G or third generation mobile) licences. The net effect on investment has been mixed. The mobile cellular sector has been allowed to grow, but only after initial policies that restricted market entry and seemed to privilege certain companies, for example in the Kyrgyz Republic. Only when true competition was allowed did prices fall and demand start to take-off.

4.4 Technology Effects

Turning to the technology effects, in all five Central Asian economies cellular mobile technology is transforming the issue of access to basic telephony. However the licensing regimes and spectrum management policies have not yet taken advantage of the potential for new technologies such as broadband fixed wireless. Also, while the main line networks are mostly digital in their backbone (long distance trunk connections) the local loop networks, especially outside the capital cities remains mostly analogue and in poor condition, or simply do not reach remote parts of the country. The impact that technology should be having upon costs is then muted, and the opportunities technological developments should be offering new entrants to invest, especially in high speed Internet and data networks, are more limited than they could be or should be. However, examples of all the latest technologies can be found in each country and there is every reason to believe that rapid advances in investment would be forthcoming given the right encouragement. For example, in Tajikistan mobile operators and ISPs are using fibre and broadband wireless in Dunshanbe for their own backhaul and would welcome an opportunity to offer broadband fixed line services. The impact upon the revenues of the incumbent would be negative, assuming that competition did not immediately 'grow the market' to offset loss of market share, and this is no doubt a consideration by governments looking towards privatization. But if so, it's a largely misplaced consideration, or rather one that places the IPO share price above the benefits that competition would bring to ICT development and investment.³⁶

³⁶ Wallsten (2000, 2003) studied telephone privatizations and finds that periods of exclusivity can double a firm's sale price 'but at the cost of substantially reducing investment: exclusivity periods are associated with up to 40 per cent reduction in growth in the number of telephone mainlines.' (p.16) 'Telecommunications Privatization in Developing Countries: The Real Effects of Exclusivity Periods', url: <http://aei-brookings.org/admin/pdffiles/phppq5.pdf> Working Paper and AEI-Brookings Joint Center for

4.5 Markets Effects

Competition brings the market effects into full play. The undoubted winners are ICT users as competitors seek cheaper ways to deliver service, for example using VoIP to bypass IDD tariffs, compete on quality of service, and innovate in terms of technologies, and in terms of services being offered and pricing schemes. The short-term loser is the incumbent, but the incumbent is also the best placed to make long-term gains because of their embedded local loop networks. The long-term benefit of allowing full market competition is that it draws in fresh sources of capital investment and stimulates service innovation. The spillover effect is based upon the price elasticity of demand plus a demonstration effect as companies copy the most successful examples. More businesses buy computers, connect them to each other and to the Internet, begin connecting to their suppliers, to their banks and to their customers, and the diffusion of ICTs is accelerated throughout the productive sector of the economy. As the level of ICT activity picks up, so banks and capital markets are attracted to lend to ICT projects, and as the capital markets grow this in turn offers new entrants an exit strategy as well as an entry strategy. Kazakhstan and Uzbekistan because of the size of their economies are beginning to show the first signs of this market growth. Of the smaller economies, Mongolia (due to policies) and the Kyrgyz Republic (due to traditional strengths) are showing the more impressive market dynamics, while Tajikistan has the potential to use market forces if and when policy shifts gear to encourage it to happen.

4.6 Combined Effects

In sum, the combined effects of policies designed to free up the ICT (especially the telecom and Internet) markets to take advantage of the new technologies bring a crucial benefit, drawing in new sources of capital investment and freeing up public resources for other uses. The 'virtuous cycle' that enlightened policies can put into motion produces wide-ranging benefits, including cost transparency, product and service innovation and new sources of revenues, which in turn can help finance the spread of ICTs to low income and uneconomic areas of the country. All the Central Asian economies are at the early stage, and none have yet entirely embraced the policy initiatives that this model requires. On paper the aims and objectives of policy do reflect the components of the model, for example the need for transparency and liberal licensing policies, yet the implementation of policies falls short. How to rectify this situation? This is the theme of the final part of this paper.

V. Strategy Framework: Lessons and Proposals

Since the advent of the Internet there has been a plethora of papers, reviews, studies and policy advisories about how ICT development can best be achieved, and how ICTs can address issues such as poverty reduction through e-health and e-education programmes, through ICT community access points and telecentres to give communities such as farmers and herders and traders access to vital environmental and commercial

Regulatory Studies cited in J.Ure 'Privatization and regulatory issues' chapter 5 in UNDP/APDIP (2004) *ICT Policies and e-Strategies in the Asia Pacific* <http://www.apdip.net/publications/ict4d/e-strategies.pdf>

information and even the opportunity to advertise their products online, and how ICTs can be used to raise the status and dignity of women and give girls equal education and training opportunities.

5.1 Women and ICT Development

It is probably no exaggeration to say that bringing ICT access opportunities to women who constitute fifty per cent of society is the single most productive achievement for ICT community development. For this reason this issue appears first on the list. An absolutely essential website for literature to support this contention is the UNDP-APDIP site at <http://www.apdip.net/>. Among the many examples often cited is the case in Bangladesh of the Grameen telephone project in which micro-loans are made available to village women to buy mobile phones. They repay the loans from small call charges they raise from the village. Women are often found to be more reliable than men having to bear as they do most of the responsibilities of the family caring for the very young and very old, and they tend not to spend money on alcohol. The scheme raises their status and makes a business that pays for itself as well as bringing the wider benefits of communications to the villages. The sustainability of initiatives such as this is relevant to the Central Asian economies, as is the gender equality objective.

Examples are given in the Country Profiles of initiatives to bring the benefits of ICTs to women. In Uzbekistan the Tashkent University of IT (TUIT) houses the first Center for Women's Training in Telecommunications and IT (CWTTI) in Central Asia, and according to the UNDP there is now a Women's Committee NGO, but appointed by the Government. The Kazakhstan country profile mentions the Podrudi Crisis Centre in Almaty which runs a safe house for battered women and offers online help, advice and assistance, but is struggling for funds. There may be other initiatives by community groups going rather unnoticed, including ICTs for disabled groups.³⁷

It is highly recommended that, following initiatives by the UNDP and NGOs, gender issues are mainstreamed into each and every ICT programme, and that funding assistance (grants, matching loans, the free use of premises, sharing access to equipment, help in finding donors, tax relief for donors, etc.) is taken seriously. The returns on ICT development among women are likely to be high in personal, financial and social terms.

5.2 Framework Policies and Priorities

Traditional thinking places the development of framework policy top of the priority list. A typical 'ICT policy model framework' is a chart matrix of vertical and horizontal elements as illustrated below, taken from the UNDP (2003) *E-commerce and Development Report*.³⁸ It is a useful conceptualization of the elements of policy thinking that need to be welded into a holistic view of ICT development. It reflects 'best practice' in terms of procedure, in terms of how to go about designing good policies. But it does

³⁷ In Malaysia the author was recently shown by a blind association how audio software allowed them to use the same office suite of applications as sighted people.

³⁸ See http://www.unctad.org/en/docs/ecdr2003_en.pdf

not correspond very closely to the capacity of many governments to actualize those policies, to implement them. The UNDP report cites a 2002 UNCTAD report that ‘reveals that many ICT strategies did not distinguish between e-business and other ICT policies.’ (p.65). Basic policy flaws such as this illustrate a general problem according to the UNDP, the need to enhance awareness ‘and a public understanding of the benefits of

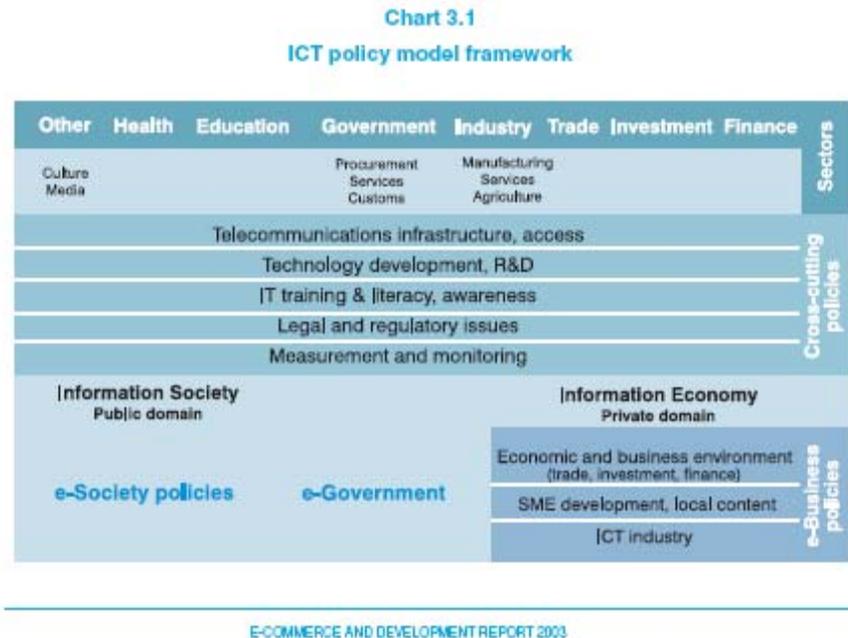


Figure 5.1 A typical ‘ICT policy model framework’

ICT is often an important starting point in policy planning.’ This is absolutely true, and the Country Profiles suggest this lesson is well understood both by governments and by the industry itself. But awareness by who and of what?

Awareness comes in two categories, to those who could benefit and to those who have to implement and administer policy. The first type of awareness, which the UNDP report refers to,³⁹ requires training in how to use ICTs to add value to life.⁴⁰ Schools training, community centre training, etc., are all priority issues for the Central Asian governments, the private sector and the NGOs. The second type of awareness is more complex. It involves the acquisition of knowledge, the management of information and the development of project management skills. When governments allocate resources for computer information management systems or databases for revenue departments or ministries of education or health, or for public access points and community centres, they

³⁹ ‘Awareness can be heightened in a variety of ways, including through appropriate curricula in the education system, sharing of best practice, media campaigns, public demonstrations to familiarize stakeholders with relevant technologies, government and company-sponsored training, and workshops and conferences.’ p.68.

⁴⁰ The issue is a positive awareness, not a normative ‘should’ use. It may be a rational choice not to invest in ICTs.

rarely include significant resources for skilled people to thoroughly assess the costs and benefits of particular projects, to prioritize according to a rational calculus of return on expenditure, and to supervise the build up of organizational capacity to make the best use of the ICTs. This aspect of awareness within government policy - in cases where the government plays a proactive role in ICT development as in the Central Asian countries - is frequently absent or receives scant attention and resources, and yet is it perhaps the most crucial part of ICT development at the highest levels.

It is recommended that these issues receive far more attention within the policy framework and that the focus of donors as well as recipient governments adjusts towards the implementation processes even in cases where the overall policy framework, including normative laws, decrees, enabling legislation, subsidiary legislation and regulations, may not be complete. This implies that the implementation process may not conform to 'best practice', but it should conform to 'good practice' which is the best that can be achieved with the constraints of the time. For example, the telecommunications regulator may not be 'independent' and may not have total control over spectrum management issues, and may not have clear cut licensing authority, but the regulator can still be benevolent to the activities of the private sector where they involve new investment and genuine ICT development and can be transparent about it by explaining clearly the policy being pursued and the reasons for it. In this way the private sector can make an assessment of the degree of regulatory risk involved and invest accordingly.⁴¹

It is recommended that donors and governments prioritize empowering implementation agencies, such as the telecommunications regulator, education and health ministries, community organizations, to develop the necessary project management skills and initiate projects that will start driving the 'virtuous loop' model. For example, putting computers into schools is a process that could engage local companies as vendors and as systems integrators in repair and maintenance contracts, and in offering specialized training and educational materials for an ICT curriculum. The telecommunications regulator could encourage cellular operators and ISPs to provide broadband wireless access to schools in return for operating licences in the locality, and so forth.⁴²

5.3 Poverty Reduction Programmes

Central to the policy frameworks that have been developed with donor assistance in the Central Asian economies is poverty reduction. From one-third (Mongolia) to over 80 per cent (Tajikistan) of the populations are below the official poverty lines. The primary ways to tackle poverty reduction revolve around livelihood issues, access to land, to fresh water, to education, to jobs, and so forth. When people are offered the opportunity to lift themselves and their families out of poverty they will usually take it, so the long term solutions all involve opportunities while the immediate solutions involve support. Where

⁴¹ Ure (2004) found that regulatory risk was the number one concern of potential investors in telecommunications in the Asia Pacific region. The others in order of rank were rate of return, quality of local partners, direct control, country risk, repatriation of profits, currency risk, the scale of investment, and insurable risks. See *The Way Forward* http://www.trp.hku.hk/publications/telecom_note040721.pdf

⁴² The ITU's annual *World Telecommunications Development Reports* provide exhaustive evidence that liberal markets encourage investment in telecommunications.

do ICTs fit in? Typically at the community level, for example public access to telecommunications and increasingly to information from the Internet, sometimes relayed by community radio or TV. But pre-paid mobile phones are also proving valuable to individuals who rely upon being contactable for work wherever they may happen to be. The mobile phone revolution is only just beginning in the Central Asian republics, which underscores how slow their telecommunications policy development was to take off. In three of the five republics mobile phone users still trail fixed line subscribers. Worldwide mobile users exceeded fixed line subscribers in 2002, with developing countries in the lead.

One aspect of poverty is where it is located, its spatial distribution. A global phenomenon is the migration of poor people from rural areas to peri-urban areas, clustered around the outskirts of urban areas, for example Ulan Bator, and there seems to be anecdotal evidence this is happening in Central Asia. This presents new challenges, such as the need for new water and waste disposal systems, new housing, schools, health clinics, etc. It also offers new opportunities to provide a cluster of amenities together, for example a road scheme, a water scheme, a telecoms network and a clinic. This requires cross-agency coordination (working to a common schedule) and collaboration (agreeing budgets), but can be more effective than undertaking infrastructure projects separately. This argument is strongly supported by Charles Kenny in a 2005 discussion paper for the World Bank⁴³ where he also points out that ‘telecenters will have a higher economic rate of return if they are multipurpose.’ (p.35) A common fate of telecentres is they collapse after the initial funding runs out. If a clustered approach can be adopted the chances of success can be much higher, especially in areas where poverty is intense.

It is recommended that studies are carried out to identify the spatial distribution of poverty and the results are fed into a cross-agency planning process to develop a clustered approach to ICT development in poor areas. Universities, NGOs and other experts can be called upon to assist in this research.

5.4 Encouraging ICT Investment

Experience worldwide suggests that there is a hidden demand even among the very poor for services such as telephone access and applications, and that supply will often reveal that demand for the first time. Typically even in rural areas people are willing to pay between 1 and 5 per cent of their disposal income on telecommunications, with 2-3 per cent being a reasonable average.⁴⁴ Another recent finding from a World Bank study is that people in developing countries who had telephones were just as likely, not less likely, to make use of dial-up Internet.⁴⁵ Evidence from across the world is showing that

⁴³ Financing Information and Communication Infrastructure Needs in the Developing World: Public and Private Roles: Draft for Discussion
http://lnweb18.worldbank.org/ict/resources.nsf/a693f575e01ba5f385256b500062af05/04c3ce1b933921a585256fb60051b8f5/USDFILE/financingICT_Draft.pdf

⁴⁴ R.Kayani and A.Dymond (1997) *Options for Rural Telecommunications Development*, World Bank Technical Paper No.359, The World Bank, Washington D.C.

⁴⁵ ‘In this paper we have investigated the determinants of the “digital divide” between high-and low-income countries. Surprisingly, we find there is no gap in Internet intensity (Internet subscriptions per telephone

when villagers are offering the chance to use mobile phones at affordable prices they grab the chance. The most recent example is the phenomenal growth of mobile phones taking place in India, and before India in China. Both cases illustrate the simple fact that if the market is opened to competition, even competition restricted to national companies as in the case of China, it will stimulate growth and investment will be attracted.

The Central Asian republics have a variety of policies towards ICT markets, some more restrictive and some less restrictive, and the results are evident from Figure 2.1 on page 7. It is recommended that all restrictions on new entry and foreign investment be lifted in the telecommunications markets, and that regulations become permissive, but with the proviso that consumers are protected against poor commercial practices and that the regulator requires interconnection between networks. It is also recommended that the powers of the regulator are enshrined in law, and that the details of telecommunications regulation, including tariff levels, are removed from the law, and that the regulator is made ultimately accountable either to a ministry or to Parliament.

VI. Conclusion

The low per capita incomes of the Central Asian economies with populations that are relatively (and in three cases absolutely) small compared with notable emerging regional economies such as China, India, and Russia, place these countries at a disadvantage for attracting private investment, especially foreign investment, in the short term. Their domestic markets are small, their physical and commercial infrastructures underdeveloped, and their business environments often difficult with perceived political uncertainty and regulatory risk. This is the downside.

On the upside is that after some difficult early years each of the five economies is showing signs of economic growth, a process that is encouraged when there is political and social stability. With regard to the development and adoption of ICTs, what varies notably across these economies is the relative weight attached to the roles of the public and private sectors. Where the state has resources, the public sector can take the lead if that is the policy preference and judgment of planners. This is particularly the model in Kazakhstan and especially Uzbekistan. Where the state is far weaker financially, as in Tajikistan, the private sector is relatively more active in driving ICT adoption almost by default. Kyrgyzstan and Mongolia fall somewhere between the two ends of this spectrum, the state attempting to play an active role, yet recognizing that the private sector's resources are vital to success.

There are no doubt different roads to success, but fundamental to each is likely to be a focus on the implementation of the policy frameworks and the project management skills required to implement efficiently and effectively. This will require some adjustment in thinking by donors as well as governments, from 'best practices' to 'good practices' which emphasize clear objectives and transparency to reduce regulatory risk and encourage investment in the ICT sector.

mainline).' S.Dasgupta, S.Lall and D.Wheeler (2001) 'Policy Reform, Economic Growth and the Digital Divide' Policy Research Working Paper WPS 2567, The World Bank, p.15.

Appendix 1: The Five Country Profiles

Kazakhstan

ICT development is high on the agenda of the Government of Kazakhstan for reasons of national economic and industrial development and for political and social stability. With regard to economic and industrial policy, Kazakhstan enjoys strong growth in primary product exports, for example oil and minerals, and aims to increase the local value-added content to processing and manufacturing by upgrading domestic production as part of the Industrial Innovation Development programme (IID). ICTs are seen as a critical development tool within the IID. For example, local software development for the mining industry is being targeted as an area in which Kazakhstan can develop a competitive advantage.⁴⁶ More generally, providing a modern and ubiquitous telecommunications infrastructure based upon Next Generation Network (NGN) IP-based technologies is seen as a national priority, including the development of a national backbone network or 'information superhighway' which is also seen as extending the political and social reach of the Government. For example, state-owned Kazakh Telecom is using the backbone network to connect polling stations as part of a countrywide e-Election project called 'SAILAU'. Stage One was completed in 2004. A project to set up 16 national cultural centres linked to a Website to represent Kazakhstan's over 130 ethnic groups is being overseen by the Academy of Information Technology in Almaty, together with its seven associated technology universities across the country. The Academy is also taking the lead in connecting 50 community centres across the country to provide access to e-Government, and is providing free training for the public in the use of PCs through a joint programme with Microsoft and the UNDP.⁴⁷ Non-government organizations are also active, although they face major funding difficulties. For example, the Podrudi Crisis Centre in Almaty uses a Website to promote non-violent personal relationships and to provide legal advice and counseling, but without direct government support such NGOs are highly dependent upon overseas donors.

The size of Kazakhstan's domestic market makes it attractive to international vendors of telecoms equipment and IT hardware and software. Most of the global corporations have local agents, representative offices or have established an actual presence in Kazakhstan.

Policy, Laws and Regulations

Strategic Policy: Role of e-Government and Project Management

It is evident that e-Government is seen as a means to multiple ends. First, because the role of the state remains dominant in Kazakhstan, any increase in the efficiency of government and state-owned enterprises will pay dividends for society as a whole. Second, e-Government is seen as a means to coming closer to the people and explaining Government policies and making Government more accessible. This is clearly also

⁴⁶ See <http://www.mining.kz>

⁴⁷ The Academy and its seven associated technology universities are involved in many such projects, for example connecting up schools, providing e-textbooks, maintaining a register of civil organizations, ICT training for housewives, etc. See <http://www.Academy.kz> and for the Almaty Technology University, see <http://www.atu.kz>

regarded as a way to stabilize society. Third, e-Government is seen as a way to spread access to ICTs within the economy and stimulate investment in ICT assembly, production and usage as part of the wider Industry Innovation Development programme. This includes proposals such as the Special Economic Zone for the Almaty Information Technology Park. Fourth, e-Government extended to social welfare sectors such as schools and to rural areas is seen as a means of inclusive development, and as a way to raise human capital resources.

In each of these areas the plans are ambitious, but they will require the skills of project management if they are to be successfully realized in an efficient manner. One of the programmes of the Academy of Information Technology in Almaty is to train government officials in the skills of project management, and the key role of the Centre for the ICT Development Fund, based in Astana, is to project manage the e-Government programme. Because the role of e-Government is so strategic in Kazakhstan's overall programme to attract investment into the country's ICT development, the importance of project management skills should be regarded as uppermost. A good example will be the future of the technology parks programme, and the ability of the Technology Transfer Centre in Astana who project manage the programme, to work with the MNCs and local entrepreneurs to tailor the programme to realistic expectations on both sides.

Strategic Framework: Telecommunications

The basis for reform and liberalization of the telecommunications sector has been established with the passing of the Telecommunications Law of 2004 and the setting up of the Agency for Information and Communications (AIC). The law is the major telecoms outcome of the 2003-2005 special sectoral reform programme,⁴⁸ along with subsidiary legislation and implementing regulations, but the decision to establish an independent regulator ahead of applying for WTO membership has not yet been implemented. Technical assistance from the EBRD (European Bank for Reconstruction and Development) has been pledged for this purpose, and its achievement will be important for attracting domestic private and foreign investment into the sector because reduced regulatory risk is a key component of the decision to invest.

The Medium Term Programme for Telecommunications Development, 2006-2009 identifies preparation for WTO membership a priority, alongside a reform of radio spectrum management and the conversion of frequencies currently used by the military to civilian purposes.⁴⁹ These reforms, which are important if investment in new wireless technologies is to be encouraged, will involve additional resources together with a commitment to modernize and extend the reach of telecommunications networks nationwide, but discussions within Government over budget allocations need to be resolved before the details of the Medium Term Programme are finalized. However, the outlines of the policy are clear. The incumbent public operator, Government-owned Kazakh Telecom has lost its monopoly rights over the PSTN, allowing six other networks

⁴⁸ The Sectoral Programme looked at three 'natural monopolies', namely power, railways and telecommunications.

⁴⁹ This will involve the cost for the military of having to replace equipment for use of alternative frequencies.

to compete, including TransTelecom, previously the network of the national railways, and KazTransCom, the network owned by the national oil corporation. Kazakh Telecom has also lost its monopoly over international traffic, although as a cushion to its revenues ahead of privatization the four mobile cellular operators are still required to use its international gateway until 2006.⁵⁰ Kazakh Telecom is also the major shareholder of Kcell, the largest cellphone operator that has around 80 per cent current market share. Eighteen per cent of Kazakh Telecom's traffic in 2004 came from cellular transit and 16 per cent of total revenues arose from PSTN interconnection charges, which are regulated by the Agency of the Republic of Kazakhstan on Regulation of Natural Monopolies.⁵¹ Maybe the regulation of tariffs and network charges will eventually shift to the independent regulator when that agency is finally established. These changes are necessary. 'A report by UNCTAD ranked Kazakhstan 166th of 180 countries in 2000 on its ICT Development Index.'⁵² In 2005 Kazakhstan was ranked 62nd out of 65 in the EIU's E-Readiness Index, but this was one place higher than in 2004 and at least Kazakhstan was on the index, a sign of some progress.

Overall responsibility for progress lies with the AIC, which includes overseeing the effort to ensure inclusive development by promoting access in rural areas. Significant efforts are being made by Kazakh Telecom to upgrade rural communications. In July 2005 Kazakh Telecom announced that 80 per cent of villages now had connectivity, and the objective is to bring telecommunications to 40 per cent of the 886 rural villages that have no telephone with populations of over 50 people by end-2005. To fund these efforts a universal service fund is to be established with all telecom companies expected to make contributions. A further strategic focus is to enhance the national backbone network and international connectivity. Kazakhstan also has plans to launch its own satellite KazSat possibly as early as late 2005. A third strategic focus is to upgrade the network to digital as a means of access to the Internet.

Strategic Framework: Information Technology

On the IT side of ICTs 2004 saw a Presidential decree on the State Development Programme for e-Government, followed by a government Plan of Action. The AIC has been given overall responsibility to coordinate IT efforts, but there is also a Commission for Financial Control and State Procurement under the Ministry of Finance to supervise

⁵⁰ Kazakh Telecom is 50% + 1 share owned by the Ministry of Finance, 30.4% by Central Asian Investment Holdings, and 6.7% by the Bank of New York. In 2004 Prime Minister Akhmetov 'criticized the Agency for Informatization and Communication for its slowness in preparing and promoting Parliament's draft laws. Akhmetov urged the agency to expedite the examination of all the necessary documents and to complete the measures development plan, so that the telecommunications market break-up plan can be adopted in the shortest time.' (*Interfax-Kazakhstan*)
<http://www.kazakhstaninvestment.com/kz-news-05-25-04.html>

⁵¹ Besides gateway charges to mobile operators, fixed-to-fixed wholesale prices (leased circuits and transit traffic) are under regulation. Other charges between fixed and mobile operators are left to negotiation without a benchmark Reference Offer for Interconnection (ROI).

⁵² Locksley and Williams (2004) 'Background Paper No.9: Sustainable Development and Diversification in Kazakhstan – The Central Role of Telecommunications and ICT: Priority Actions' Joint Economic Research Program of the Ministry of Economy and Budget Planning of the RK and the World Bank, p.6 in reference to UNCTAD (2003) *Information and Communication Technology Development Indices*, UN, New York.

the introduction of e-Government with an immediate focus upon e-procurement. Project management responsibility has been given to the Centre for the Development Fund for ITC. Cross-agency coordination to achieve a ‘one portal’ format for supply companies contracted to deal with different ministries and agencies of government, and responsibility to vet the credit-worthiness of these companies and register them, falls to the Centre which can ask the AIC for assistance, but ultimately the Commission takes charge. The Commission meets every six months to monitor progress and is chaired by the Finance Minister.

Strategic Framework: Investment Policies

With massive oil and gas reserves, since the founding of the Republic in 1998 to 2000 Kazakhstan was able to attract over USD10 billion in foreign investments. The Industry and Innovation Development (IID) Strategy, 2003-2015, aims to increase the value-added economic activities of industry by shifting up the value-chain from agricultural production and extractive industries to processing and manufacturing of intermediate and final goods products.⁵³ Foreign as well as domestic investment is to be encouraged in these national priority areas. As part of the strategy the new Law on Investments was introduced in 2003 offering exemptions on customs duties on certain imports and tax preferences in relation to corporate income tax, value-added tax, property tax and land tax for a period up to 5 years for investments in areas of national priority, to a maximum of 30 per cent of the investment, to be decided on a case-by-case basis without specific distinction between foreign and domestic sources of capital.⁵⁴ Computers, measuring and control devices and instruments are included in the list of qualifying capital investments, subject to there being no local production, or insufficient local production or local production that fails to meet the investment requirements. Major IT and telecom investment projects would seem to fall within this law.

Also under the IID programme a series of ‘technoparks’ is being developed under the authority of the Engineering and Technology Transfer Centre. These include the proposal for an IT Technology Park outside Almaty. To encourage multinational ICT companies to invest in R&D and production facilities the park will be declared a Special Economic Zone exempt from customs duties on imported inputs, and from VAT, land and property taxes as outlined above. Whether these investment incentives will be sufficient to overcome some of the constraints currently facing Kazakhstan, such as transportation costs, the small size of the local and regional market and the small number of local IT graduates, remains to be seen. An incremental approach is advisable, building up synergies between foreign and domestic resources in a way that ensures good linkages with the local economy.

Growing cooperation between Kazakhstan and China is another avenue for foreign investment. Following a visit to China by President Nursultan Nazarbayev in 2004, a joint venture with ZTE (China) called KarNurTel was established, and discussions are

⁵³ Kazakhstan wants to avoid the ‘Dutch’ disease of oil revenues fueling inflation. The IDD envisages seven ‘clusters’ of industrial development, including ICTs.

⁵⁴ The Kazakhstan Investment Promotion Centre is a government organization for facilitating direct investment.

under way about a rural telecommunications project to be financed by ZTE with production of equipment by KarNurTel in Kazakhstan.

Technology

Technology: Telecommunications

Kazakhstan, like Mongolia, inherits several networks from state corporations in addition to the PSTN of Kazakh Telecom. The technical priorities include digitization and therefore Internet access, building a national optical fibre backbone network with modern international gateways, and adopting cost-effective technologies to extend the network into rural areas as part of the universal service commitment. Digitalization reached about 60 per cent by late 2004, including 100 per cent in five cities, and averaged 67 per cent in urban areas and 30 per cent in rural. An 11,000 km East-West-North-South crossed loop of fibre-optical communication lines (FOCL) has been completed as the National Information Super Backbone (NISB) with three International Switching Centres (ISC) installed. The western section is especially important, despite distances, because large oil and mineral extraction companies are located there. Fixed, fixed-wireless (CDMA-450) and satellite solutions (using Dynamic Assignment Multiple Access or DAMA technology) are being used or developed to provide rural access.

Besides cable (coaxial and fibre) there is almost no local production of telecoms equipment in Kazakhstan and USD244 million was spent on imports in 2004, an increase of around 40 per cent over 2002, representing around 97 per cent of domestic equipment needs. Increasingly cellphone manufacturers are creating lower cost handsets for import. For example, an LG (Korean) handset can sell below USD200, and these prices are expected to fall.

Technology: Hardware

On the hardware side, locally assembled computers represent around 65 per cent of the market, with branded imports making up the rest, but discussion is underway for a joint venture to produce notebook computers locally within a technology park zone. Customs duties paid upon imported products and components would be waived in such cases.

Technology: Software

All major players are represented in Kazakhstan. For example, Microsoft reported sales in 2004 doubled, and Oracle expected to double sales in 2005. Ninety per cent of Oracle's sales are with 200 customers.

Markets

Markets: Telecommunications

Six fixed line operators and four mobile cellular operators give the appearance of competition, but Kazakh Telecom holds around 96 per cent of the PSTN market and Kcell, in which Kazakh Telecom is the largest shareholder,⁵⁵ dominates the cellular market with about 80 per cent of users. The fact that some of the fixed line operators are backed by financially strong state corporations, such as oil and railways, should ensure

⁵⁵ TeliaSonera (Finland/Sweden) and Turkcell (Turkey) are the other major shareholders through FinTur.

their survival, at least in the national long distance wholesale markets.⁵⁶ In 2004 mobile subscribers overtook the 2.5 million fixed line subscribers, and by May 2005 stood at 3 million. Clearly there is room for tremendous growth and for at least two or three cellular operators to be profitable. At the start of 2005, besides Kcell, the other GSM operator K-Mobile had over 400,000 subscribers,⁵⁷ and of the two CDMA operators, Dalacom had over 100,000 subscribers but the new entrant Telecom Service had yet to go beyond a thousand.⁵⁸ The minister has spoken in 2005 of freeing up additional spectrum to licence a third GSM operator. Most subscribers use pre-paid and will have more than one card to avoid paying premium rates for 'off-net' calls to subscribers of other networks, so subscriber numbers will include a lot of double counting. Mobile call charges remain higher than they should because of the lack of interconnection. For example, calls between the GSM operators were required to transit Kazakh Telecom's network, but according to the AIC this requirement has been removed and direct interconnection is on its way. Similarly, international calls from mobile phones are required to transit Kazakh Telecom's gateway, but from 2006 this requirement is also likely to be dropped.

Four types of PSTN retail prices are regulated: local, national long distance (NLD), Internet and telegrams, each being regarded as having social consequences. The rebalancing of tariffs started in 2004 when international long distance (ILD) charges decreased an average of 20 per cent and local urban tariffs rose 20 per cent, but rural tariffs remained unchanged.⁵⁹ Although ILD traffic is only 8 per cent of the total, 7 per cent of it to CIS countries, it gave rise to 58 per cent of Kazakh Telecom's revenue in 2004, down from 60 per cent in 2003. Local traffic is 74 per cent of total, but only 17 per cent of revenues, very close to the popular '80:20 rule'. PSTN residential tariffs (business tariffs are higher) are flat rate, with monthly rentals at 470 Tenge in urban areas and 270 Tenge (USD2) in rural areas. By contrast a pre-paid mobile card will cost USD5, although the number of minutes allowed and special calling rate schemes vary, for example 'on-net' and 'off-net'. On the equipment side, cellphone handset prices have fallen to below USD200, a trend expected to continue.

Internet service licences are easily available and there are many ISPs, but most are inactive or reselling because Kazakh Telecom's USD20 per month dial-up for 128Kbps (a higher price for 560Kbps) is hard to beat. The price includes the customer modem, but insufficient modem capacity in the exchanges is hindering growth. Other competitors include SA Telecom, owned by Golden Telecom (Russia). SA Telecom recently installed 1,000 city telephones in Astana's 'New City' development, providing fast Internet access and in cooperation with Kazakh Telecom long distance telephone services, a

⁵⁶ For example, Kaztranscom is owned by the state oil and gas company.

⁵⁷ The parent company Limnotex was bought in 2004 by Russian investor Vimpelcom who then sold a 50 per cent + 1 shares (but with buy-back options) to Crowell Investments, a company associated with some of the shareholders of the Kazakh AFT bank, due it seems to outstanding debts owed by KarTel's previous owners in Turkey.

⁵⁸ These are brand names. GSM Kazakhstan owns Kcell and Activ, KarTel owns K-Mobile, Excess and Beeline, while Altel owns Dalacom and Pathword. From May 2005 it became possible to pass SMS between the GSM and CDMA networks. The EBRD has agreed to USD100 million refinancing for KarTel.

⁵⁹ In February 2005 Kazakh Telecom also introduced 10 second billing on call charges. Previously calls were rounded up to the next minute.

development that both highlights Kazakh Telecom's dominant position and the potential for competitors to eventually by-pass Kazakh Telecom. Astel's KazNet is another major ISP contender. There are currently an officially estimated 600,000 users, up from 20,000 in 1998, but as yet very few home computers have Internet access. According to Kazakh Telecom's chairman, cited by the *Interfax* news agency in March 2005, 90 per cent of Kazakh Internet users access non-Kazakh web sites, which is a measure of the lack of locally developed Web resources.

The data market is less well developed, but growing. Kazakh Telecom has over 50 per cent of the market, and services grew from 4 to 5 per cent of Kazakh Telecom's revenues 2003-2004, but only number around 5,000 lines including frame relay, dedicated data lines and over 3,000 ADSL lines which have more than doubled since 2003 with individual subscribers increasing from 5 to 18 per cent of the total. 75 per cent of leased circuits go to telecom operators and only 25 per cent go to other organizations, including government. Besides the national backbone or 'national information superhighway', Kazakh Telecom is concentrating on investing in NGN technologies such as IP/MPLS for data transport networks and Metro-Ethernet for city development, for example to link all schools in Almaty to the Internet, IPVPNs for corporate customers, and ADSL for individual subscribers. Other service providers include Astel's KazNet which has a strong base of corporate customers, such as banks and post offices which it connects in rural areas by satellite.

Sales revenues of Kazakh Telecom reached USD590 million in 2004, and USD320 million EBITDA, including a profit of over 50 per cent of EBITDA.⁶⁰ Up to USD130 million was invested in the network of which USD1.6 million went into the national optical fibre backbone project and over USD8 million into rural network development.

IT Markets: Hardware

In the enterprise market, e-Government has created demand for PCs alongside the growing demand from state enterprises, foreign companies and joint ventures at the higher end of the market with PCs and flat LCD screens costing USD1,000 upwards, but with volume discounts. PC usage among local SMEs is primarily focused on locally-assembled low-cost PCs which can cost USD600. In the retail market, demand for digital and electronic products such as cellphones, AV systems, CRT and LCD flat PC screens, DVDs, camcorders, TVs, printers, etc., is growing rapidly, by over 70 per cent in 2004 to USD1.2 billion. At least two Russian retail chains, Euroset and Dixis, have entered the market. In addition there are companies like BDT Telecom that supply and install telecoms and computing networking equipment and act as agents for international vendors.

IT Markets: Software

IT software companies fall into three categories: developers that serve mainly government which is responsible for around 40 per cent of the market, and some private companies responsible for 60 per cent of the overall market; solutions providers and consulting services for corporate business enterprises; and software vendors selling

⁶⁰ Earnings before interest, taxation, depreciation and appreciation.

foreign imported or local software products. Despite the prevalence of non-licensed software usage, the use of licensed software is reported to have risen two-three fold 2003-2004. Up to 20 per cent of the overall market is accounted for by foreign organizations, companies and joint ventures in the energy, banking, accounting and infrastructure sectors. Government, banks, telecoms and energy companies are major users of database software, while most corporate demand comes for enterprise resource management software solutions, such as accounting packages, payroll packages, etc.

Kyrgyzstan ⁶¹

Despite its small population, the Kyrgyz Republic has a history of ICT expertise, especially in computer science. It used to host several high-tech manufacturing plants for the Soviet military, and although these are long since gone the country retains the higher education infrastructure that taught and trained IT graduates. In 2005 the Kyrgyz Republic agreed to set up a joint production facility in Russia to design and manufacture special communications equipment for defence and other purposes, thereby leveraging its traditional strengths in the field. Although the effective teledensity in Kyrgyzstan is only half that of its close neighbour Kazakhstan, the two countries have the same population density of Internet users.

Since the downfall of the previous Government by 'People Power' in March 2005 the new Government has taken steps to reduce and simplify the customs and taxation systems as measures to attract foreign investment, and the exemptions enjoyed by ICT imports continue. It remains to be seen whether the pro-ICT policies and ICT policy-making agencies established prior to the new Government taking office will be continued, but all the signs are that they will, and the incoming Government has given assurances that the privatization programme will not be reversed. The 2002 UNECE reports 'Kyrgyzstan has the most liberal regime of the Central Asian States' (p.37)

Policy, Laws and Regulations

Strategic Policy

The guiding framework for ICT policy was established in 2002 by Presidential decree titled *Information and Communications Technologies for Development in the Kyrgyz Republic*, or known as the National Strategy for short.⁶² An Action Plan⁶³ was included to implement ICT strategy development within the context of the medium-term Comprehensive Development Framework (CDF) up to 2010 and as a means to achieving the goals of the National Poverty Reduction Strategy. An ICT Development Fund was established and early priority was given to e-government, e-economy and e-education. The US Trade Development Agency (USTDA) provided a grant of USD246,800 to carry out a feasibility study for the e-government part of the strategy.

The President also established an ICT Council to carry out overall coordination of ICT policies, and within the Administrative Office of the President the Informatization and Telecommunications Department was tasked to undertake statistical analysis, advise upon laws and the adoption of ICTs across government. However, since the overthrow and change of government in March 2005 the future role of these two bodies remains unclear, especially of the Council many members of which have left the country. The inauguration

⁶¹ Various sources including UN Economic Commission for Europe (2002) *Towards a Knowledge-Based Economy: Kyrgyzstan – Country Readiness Assessment Report*, and UNDP (2003) *ICT Business Survey in Kyrgyzstan*, M-Vector Research & Consultancy Agency.

⁶² See speech of Vice-Prime Minister K.M. Jumaliev at WSIS 2003 at http://www.itu.int/dms_pub/itu-s/md/03/wsispc2/c/S03-WSISPC2-C-0092!!PDF-E.pdf

⁶³ ICT Council (2003) *National Action Plan for the Implementation of National Strategy 'Information and Communication Technologies for the Development of the Kyrgyz Republic'*

of the new President was on 14th August 2005 and decisions about the future structure of government remain to be announced.

Strategic Framework: Telecommunications

Kyrgyz Telecom was established in 1994 inheriting the assets of the PTT from the Soviet period, and incorporated in 1997 with PSTN exclusivity until 2003. Also in 1997 a regulator, the National Agency for Communications, was established and in 2000 was renamed the Kyrgyz National Communications Agency (NCA) under the Ministry of Transport and Communications. The 1998 Law on Electronic and Postal Communications determined the functions of the NCA. From June 2005 this agency was due to assume the responsibilities of the anti-monopoly agency for the communications sector (leaving that agency with the energy sector and general anti-monopoly oversight). When the new agency is formed it will be known as the National Agency for Information Resources and Communications, and will assume responsibility for licensing, tariffing issues, spectrum management, industry supervision, and equipment certification. To tackle the problem of universal access the NCA in 2003 proposed to establish a universal service fund but the private sector objected to what they thought may be a subsidy to Kyrgyz Telecom to establish a presence in under-served areas. An NGO called The Information Future Public Foundation has taken the lead through cooperation with five private sector companies 'by opening Public Information Centers (PIC) "Aildagy Internet" (Internet in the Villages) and by providing telephone communication to the villages void of it.' According to Karamoldoev Altynbek, Coordinator for PIC opening, Information Future Public Foundation gives an opportunity for the local companies to make a smart investment into the future of the country and their own business.⁶⁴ The Foundation was formed in 2000 with backing from telecom and electronics companies, and emphasizes the role of social responsibility for the private sector. So far 35 PICs have been established offering Internet access and training for up to 20,000 villagers. According to the Director of the Foundation, Nurbek Toichubaev speaking at a conference organized by the Foundation in August 2005, the aim is to set up at least another 1,500 centres, and another 100 by the end of 2005. He pointed out that over 500 villages in the country had no telecommunications at all. Oleg Jerebko, Executive Director of the Communications Operator Association, at the same conference pointed out that 30 per cent of those over 500 villages were actually in cellular coverage areas, although there were not yet users.⁶⁵ In the meantime the NCA has commissioned a Canadian consultant to examine the USF issue further.

The first major telecommunications reconstruction project was a loan from the World Bank and EBRD for USD27.4 million to set up satellite earth stations, reconstruct a national network between regional centres, introduce digital exchanges in Bishkek and regional centres and link those in Bishkek with optical fibre and SDH transmission technology. Further reconstruction projects included USD12 million from the Republic of Korea to introduce digital exchanges in the Chuy valley area and link Bishkek along the valley to main towns with optical fibre; a project funded by the Kuwait Fund of Arabic

⁶⁴ <http://www.fib.kg/index.php?newlang=english>

⁶⁵ On 16th-17th August 2005 the Information Future Public Foundation organized a conference in Bishkek on 'Rural Internetization in the Kyrgyz Republic', supported by the EBRD, UNECE and UNDP.

Economic Development for USD8.6 million to modernize the networks in the south, in the Osk, Jalalabad and Bakten regions; the Kyrgyz part of the Trans Asia-Europe Optical Fibre (the Virtual Silk Road) has been completed, including the use of microwave; and the National Research and Education Network (NREN) sponsored by NATO Science Programme with a 2.5Mbps link between educational and research institutes by satellite.⁶⁶ Despite these important improvements the national network remains woefully underdeveloped with under 40 per cent of exchanges lines digitalized by August 2005, although this represents an increase from 30 per cent in 2002.

State-owned Kyrgyz Telecom lost its monopoly over domestic and international traffic in 2003, but remains completely dominant and responsible for generating sufficient revenues to repay the loans. Three fixed line companies have been licensed to compete, and two have started operations, SaimaNet and WinLine.

Strategic Framework: TV and Radio

Radio and TV broadcasting and press freedoms have been more evident in the Kyrgyz Republic than in many countries of Central Asia. There are two TV networks of the state-owned Kyrgyz National TV and Radio Broadcasting Corporation, and six other privately run networks, and two state radio networks and three private radio stations.⁶⁷ Having said that, Sultankulov Sanjar, Manager of the UNESCO-funded Community Multimedia Centre in Talas city, speaking at the Information Future Public Foundation conference in August 2005 (see above) explained they had been waiting for over a year for a public radio broadcast licence.⁶⁸

Strategic Framework: Information Technology and e-Government

The first installation was an IP-based State Computer System “Shailoo”. Its first application was to collect and process data from the Election Committee. The fact that a widespread feeling among the people that the results of the subsequent election were rigged led to revolution is a reminder that ICTs can be used, abused and misused and they are not a panacea, nor a guarantor of transparency. They are an enabling technology to be used for better or worse.

A further application of the State Computer System is within the Ministry of Finance to enhance the administration of revenue collection. Regional branches send data to Bishkek through the network. A Government portal is also supported by the system as government departments go online, supervised by the ICT Department of the Administrative Office of the President. Under the same Office is the Public Information Centre responsible to an e-Citizens portal, to provide public access to Government departments using the same platform as the Government portal. The Project Implementation Group, a World Bank funded organization, is helping the technical implementation process, sifting through mountains of data to avoid duplication and present consistency.

⁶⁶ The Kyrgyzstan Development Gateway provides a review of the foreign vendors supplying equipment under these various projects. See http://eng.gateway.kg/inf_commun

⁶⁷ See http://news.bbc.co.uk/2/hi/asia-pacific/country_profiles/1296485.stm

⁶⁸ For details, see http://www.unesco.kz/ci/projects/2004/talas/report_cmc_talas_2004.pdf

The Action Plan (2003) details e-education and the level of computer penetration. According to Ministry of Education and Culture data, by the end of 2000 only 21 schools in the country had access to the Internet, the average number of PCs per school was 2.6, only 15 per cent of schools had adequate numbers of computers and computer labs, over fifty percent of schools had no computers at all, and only 30 per cent of schools had telephone connections. The Action Plan lists out a series of priorities to rectify the situation, but does not detail specific projects. One project that has gone ahead with the aid of ADB funds is an information management system and a distance learning system for high school teachers. In the higher education sector, the Action Plan identifies more than ten universities running ICT-related courses which basically fall into two broad categories, information (software applications, databases, etc.) and informatics (computer science). According to Prof Ulan Brimkulov, Dean of the Computer Technologies and Internet Faculty at the Kyrgyz National University in Bishkek, the country was especially strong in the discipline of computer science, with 50 exchange students a year with the help of Russian funding. The funding has since ceased, but JBIC does provide assistance to the National Information Centre at the Academy of Sciences to provide up-to-date equipment and where students from the National University can upgrade their knowledge. The biggest problem faced by the Kyrgyz Republic is the 'brain drain' loss, for example to Kazakhstan where salaries are higher. In compensation, many Kazakh fee-paying students come to Kyrgyzstan to study courses in informatics.

Although e-Health was not listed as a priority area in the National Strategy, at least one project has gone ahead. Health reforms have been underway for the past ten years with World Bank assistance, and ICTs are an integral part of them. The focus is on Ministry of Health financial reform at two levels, payment for hospital patients and payment for primary or family care. The concept is to develop a unified system. The first task is to match and unify the huge patient database with the Mandatory Social Fund (health insurance) database of contributions, and to coordinate between the Republican (national) and oblast (regional) levels by the electronic transfer of data. The telecom network is too poor to allow online coordination between the oblast and raion (district) levels so data is transferred using floppy disks and CDs. Future stages of development will include patient records and making appointments, but that remains a way off. Funding as always is the constraint, but in instances such as this, the Kyrgyz Republic is demonstrating very clearly that it has the capacity to adopt and use ICTs very effectively.

Strategic Framework: Investment Policies

As a commitment to encouraging further investment in ICT sectors, in August 2003 a government decree exempted imported computer and telecommunication equipment from the 20 per cent value added tax (VAT). Specifically included in the exemption are the following: computers, including peripheral equipment (keyboards, printers, storage devices, etc.); telephones, including mobile and video phones, and pagers; electric transformers, generators, cables, antennas; liquid crystal appliances, oscillographs, and telecommunication devices. As further investment confidence building measures in 2005 the government also announced its intention to reduce profits tax from 20 per cent to 10 per cent, to offer a tax amnesty and capital legalization programme, abolish import duties in production equipment, and to commit not to renationalize.

In 2003 the UNDP published a questionnaire-based study to assess the ICT sector's concerns in its dealings with government and the effects upon investment. A key problem was the cost of obtaining licences and the time taken to get them and the prohibition at that time on IP-telephony. Customs duties were considered too high (this before the exemptions were announced) and procedures too complicated. Local taxation obligations were considered too loosely defined and open to arbitrary decisions by officials, while obtaining lines-of-credit from banks was seen as too complex, too lengthy and the interest rates too high. In addition, intellectual property rights were seen to be weak. In one sense this could be interpreted as a wish-list by any private sector companies anywhere in the world, certainly where costs and prices are concerned, but two issues stand out; first, the unnecessary complexity of bureaucratic processes that reflect system inefficiencies, and second, non-transparency and consequent arbitrariness of procedures and decisions, such as the issuing of licences or the levying of taxes and fees. The 2003 UNDP report, which was forced to rely upon non-representative sampling due to the reluctance of ICT companies to reveal details, found that foreign investors in ICTs were mostly involved in the services side, for example 25 per cent of the IT education services companies included foreign stakeholders and 19 per cent of Internet Service Providers. Russian capital was involved in over 62 per cent of companies with foreign investment. Next in line came Kazakhstan involved in 39 per cent of companies and the USA involved in 31 per cent of companies. Turkey, the Netherlands, Britain, the Republic of Korea and the UAE were also significant investors.

The Government did prepare the privatization of Kyrgyz Telecom in 2002 and although a consortium was declared the winner of an international auction, the process failed to win approval from Parliament.⁶⁹ The mountainous terrain of much of Kyrgyzstan makes network expansion countrywide a difficult challenge, but there is clearly a potential for growth as less than 9 people in 100 have a telephone, and while 90 per cent of the population falls within mobile cellular network coverage areas, only 8 people in 100 are users. Therefore both the retail and wholesale (carrier) markets are due for growth. Furthermore, incoming international calls outweighed outgoing by nearly 20 million minutes in 2001, largely due to migrant workers in Russia, Germany and East European countries, accounting for almost 30 per cent of Kyrgyz Telecom's revenues. Estimates of investment needed to complete existing transport network expansion in 2002 were USD1.6 million, and a further USD780,000 to complete international radio connections to China, Kazakhstan and Tajikistan.

As part of the wider strategic objectives of privatization of Kyrgyz Telecom and the opening of the telecoms market, the Ministry of Transport and Communications aims to have everyone within access of the Internet by 2007. The means for achieving this goal are not clear, but one direction that is receiving a lot of debate is the concept of telecentres and public access points located within rural community centres, schools, clinics and the like. This was the theme of the conference organized by the Information

⁶⁹ Parliament argued the process illegal after a German consortium won the second round of bidding following the withdrawal of a Swedish consortium declared the winner of the first round of bidding.

Future Public Foundation (see above). It is also the theme of many of the UNDP's efforts in the country to help establish public access points.⁷⁰

Technology

Technology: Telecommunications

Much of Kyrgyzstan's network outside Bishkek consists mostly of radio links to provide service to small towns and villages in mountainous areas. At the primary level this consists of a digital SDH network transmitting at 155 Mbps between radio relay stations (RRS) arranged in a nationwide ring formation. International communications are provided by the Trans-Asia-Europe Fibre Optical Trunk Line (TAE) that runs from Shanghai (China) to Frankfurt-on-Main (Germany) and by satellite earth stations, an A-standard (from the first telecommunications project funded by the EBRD) and two smaller dishes. Within the main towns fibre connects the exchanges and ADSL is selectively available to users, but for the most part the network is a mix of crossbar and even older analogue switching and transmission equipment, with less than 40 per cent digitalization. Kyrgyz Telecom plans to make use of digital CDMA FWA radio technologies to provide coverage in rural areas.

Technology: Radio and Television

TV and radio broadcasts are transmitted over a Kyrgyzstan Telecom nationwide analogue radio relay system. A satellite TV project by Kyrgyz Telecom in 2005 now allows TV to reach the south of the country for the first time. Previously the villages in the south relied upon TV channels from Russia and Uzbekistan. Radio signals are also transmitted by Vsat, although theft of aerial and communications wiring has frequently deprived villages of local reception.

Technology: Information Technology

The Kyrgyz Republic used to host several high-tech manufacturing plants for the Soviet military. These have closed, but with excellent and pure supplies of raw materials and hydro energy the country is apparently ideally suited to micro-processor production. This means the human and environment factors remain a potential, although the capital is absent and there is no local market. 'The ICT sector is presently not a major industry in the Kyrgyz economy. In 2002, the gross revenue of ICT sector reached USD50 million, which is approximately 3% of GDP.' (Kyrgyzstan Development Gateway).⁷¹ Although the ICT sector is small, there would seem to be no long run reason why Kyrgyzstan cannot emulate Ireland or the West Coast of Scotland in attracting investment into ICT hardware sectors, subject to establishing good transport and communications. In this regard, one possibility that could be explored is synergy with similar aims and objectives across the border with Kazakhstan.

In terms of data networks, several of the larger corporate enterprises have been supplied by Kyrgyz Telecom with Frame Relay, X.25 and other data transport services. The State Computer Network is the largest. Others include the National Bank, Aeroflot, the

⁷⁰ See UNDP *How to Build Open Information Societies: Kyrgyzstan*
<http://unpan1.un.org/intradoc/groups/public/documents/UNTC/UNPAN018488.pdf>

⁷¹ http://eng.gateway.kg/inf_commun (p.2)

DIMON international company, and numerous ISPs such as Saima-Net, AsiaInfo, Elcat, etc.

Markets

Markets: Telecommunications

Although state-owned Kyrgyz Telecom lost its monopoly over domestic and international traffic in 2003, it remains completely dominant. Three fixed line companies have been licensed to compete and two have started operations, SaimaNet (Russian-owned) and WinLine, but they probably command no more than 2 per cent of the market. For commercial reasons they concentrate in Bishkek offering service to the more profitable business sectors, but also offer cheap international calling cards.⁷² For example, Saima-Card offers calls to Russia for 19¢ per minute. SaimaNet is constructing fibre optic lines, while WinLine relies on wireless technology to provide local access. Local direct exchange lines in use numbered just over 420,000 in August 2005 or 8.4 per 100 population, an increase since 2002 from 380,000 in use or 7.6 per 100 population when the waiting list was close to 40,000.⁷³ Around 80 per cent of these lines are residential (around 40 per cent of them are in Bishkek) which implies less than one-third of households have a telephone, and that excludes most of the rural households which is over 65 per cent population. Monthly telephone rentals are 60 soms per month (about USD1.5) whereas the cost of depreciation and maintenance of the local loop is around 80 soms per month. Local calls are free of charge. Revenues per line are low, as they are in most CIS countries, but this suggests that a policy focused on public access telephones could boost revenues per line in areas where phones are scarce since shared lines generated higher revenues. Just over 10 per cent of annual revenue comes from local subscriptions, while around 60 per cent comes from international call charges (30 per cent) and net international settlements (30 per cent) and a further 17 per cent from national long distance call charges. A rebalancing of tariffs took place in September 2003 when Internet call charges and national long distance charges were raised and international charges for non-CIS countries lowered by 10 per cent.

By 2005 six cellular licences have been issued, but currently only three operators provide service. Katel, an American joint venture company offering AMPS, D-AMPS now upgraded to CDMA, services in Bishkek and the northern Chuy valley region, and in Osk and Jalalabad in the south as well as in the Issik-Kul lake resort area to the east of Bishkek. Katel also owns an 'A' standard satellite earth station but awaits a licence to directly offer national long distance and international services. Bitel offers GSM services, and pioneered the introduction of pre-paid cards in 2001.⁷⁴ AkTel (BiTel and a Russian company are investors) with the Fonex brand has also entered the market with GSM, and

⁷² The 2002 review of Kyrgyzstan's network by consultancy group CAIE in preparation for privatization mentions Aeropag M.R.C. having set up a DECT-based wireless network within a community in the Chuy valley. Details provided by Kyrgyzstan Telecom.

⁷³ Estimates of direct exchange lines, mobile and Internet users for 2005 given by the State Communication Agency.

⁷⁴ Post-paid services include packages for USD10 and USD30 per month for 200 or more free minutes and then call charges from USD0.20 to USD0.07 per minute. Pre-paid includes USD15 for the SIM with 200 minutes, and then USD5/10 for 200/400 minutes or USD0.025 per minute, but for maximum 14/35 days for outgoing calls.

BiTel also offers the MobiCard phone card service.⁷⁵ Kyrgyz Telecom has set up a mobile subsidiary company, KT Mobile, but is not yet operating. Although approximately 90 per cent of the population lives within the coverage area of one or other of the mobile networks, by August 2005 there were 390,000 users, up from 37,000 in early 2002. Due to relatively high prices at first the market was slow to grow, but with additional competition and pre-paid cards growth is now rapid. Tariffs have fallen from USD0.25-0.5 per minute to USD0.07-0.15 per minute.

Internet services are not recognized as a separate regulatory category in the Kyrgyz Republic, instead they are treated for licensing purposes as data communications services and companies which started from the 1990s later transformed themselves into ISPs. Elcat is the largest of the ISPs with possibly 40 per cent of the market, with Kazakh Telecom, Asiainfo (in which Kyrgyz Telecom is a stakeholder along with Russian capital) and Aknet the other major players. Among early providers were donors offering free services, such as the Soros Foundation and FreeNet. In 2003 Internet services were still delivered principally over switched circuits (65 per cent) although most customers would be organizations or Internet cafes and public access points.⁷⁶ This reflects upon the lack of digitalization of the transport network and its undeveloped state. On the other hand, over 90 per cent of the companies included in the UNDP 2003 survey (over 80 per cent of them in Bishkek) had Internet access and the overall level of satisfaction was rather favourable, price being the least appreciated aspect of service. Most ISPs refused to answer the UNDP's question of how many subscribers they had, and there is no reporting requirement to the Ministry or the regulator, but the estimate for August 2005 is nearly 16,000 individual 'data' users and over 10,000 corporate 'data' users, most of whom will be using Internet services. This compares with estimates of just over 6,000 in early 2002. For 2001-2002 the UNDP estimated there were 6,000 users and a potential for 20,000 along with around 500 websites. According to the Vice Prime Minister in 2003 there were more than 1,000 websites. 'Unfortunately from this quantity only 1 per cent support local, Kyrgyz language.'⁷⁷

Markets: TV and Radio

Under the previous President, TV and radio broadcasting was undertaken by the Republican Production Union (RPU) of radio-relay trunk lines and the transmission by RPU was deemed to fall under the umbrella of Kyrgyz Telecom. Kyrgyz state radio and TV use the RPU system, but several private TV and radio stations cannot afford the cost of doing so. Many radio stations and TV programmes are relays from Russia. One of the private TV stations, Ala-TV, is developing its own cable network, mostly optical fibre, in Bishkek. The American company Metromedia is one of the investors.

⁷⁵ The ownership of BiTel is currently under legal dispute. The company seemed to enjoy a privileged position under the previous government, not least in terms of low spectrum fees. An independent regulator would remove concerns of favouritism.

⁷⁶ According to the Communication Operators Association there are over 70 commercial centres, including Internet cafes, offering Internet services, including email, Web-access, games and IP telephony.

⁷⁷ http://www.itu.int/dms_pub/itu-s/md/03/wsispc2/c/S03-WSISPC2-C-0092!!PDF-E.pdf

Markets: IT Hardware

In the Soviet period Kyrgyzstan had many active companies in the ICT sector, 'but most of them were not able to survive in changed market conditions' (UNDP, 2003, p.7). Since 1994 there has been a steady rise of a new private sector of mostly small companies employing less than 15 people, often fewer than five. Over 80 per cent are located in or around Bishkek, the others mostly in Jalalabad and Osh. On the hardware side, companies are involved in computer assembly, network equipment and installation, repair and maintenance services. Most seem to be involved in the production of spare parts or assembly of components, for example into servers and workstations, but the UNDP found reluctance by companies to state the number of PCs sold. Only four companies in the sample survey reported assembly of personal computers. Several companies were local agents for imported brands, mostly Russian or Japanese.

Many companies seem to operate a range of services besides their registered business, for example training and education or reselling communication services. The UNDP (2003) survey found a great reluctance among these companies to reveal details of the businesses, reflecting the difficulties in estimating the size of the market. According to the Kyrgyzstan Development Gateway, by the end of 2002 there were an estimated 64,000 PCs in the country or just over one per 100 people. One estimate suggested in Bishkek is maybe up to 10 per cent of households have a PC. And according to official statistics, of these only 776 were locally produced, a decline of 45 per cent over 2001. A good PC, locally assembled, complete with LCD monitor, will cost around USD700, and cheaper machines can be bought for USD400-500.

Markets: IT Software

The UNDP found the highest paid ICT workers in Kyrgyzstan were network administrators earning up to USD56 per month and system programmers earning up to USD25 a month. This reflects the incipient growth and demand for software programming and network management, although only five per cent of companies producing software seemed to involve foreign stakeholders. Kyrgyz companies are particularly involved in Web-design, database systems and in client services, and somewhat involved in multimedia, e-commerce applications, office applications, systems utilities, and computer design. In this regard, Kyrgyzstan seems more advanced in ICTs than some of its neighbours. The Development Gateway summarizes the situation as follows: 'Software development is fairly well developed in the Kyrgyz Republic, but the majority of these companies and individuals are not officially registered and operating due to the lack of protection for intellectual property rights. It is estimated that more than 80 per cent of the local software market consists of pirated products. The availability of local qualified specialists and their relatively inexpensive labour expenses would imply a promising future for this sector of ICT.'⁷⁸ Another indicator of small but not insignificant ICT adoption is that over 300 companies had their own websites in 2003, roughly 1.3 per cent of all companies.

⁷⁸ http://eng.gateway.kg/inf_commun (p.7)

Mongolia

ICT diffusion has been made a cornerstone of Mongolian economic policy to spur job creation, efficiency gains, and improve risk management.⁷⁹ In the ICT sector, Mongolia has strengths. If a company is engaged in the assemble-for-export ICT manufacturing industry, it is eligible for a 3 year corporate tax exemption and the importation of PCs is duty free. Mongolia's universities graduate approximately 50-60 software engineers each year, and 200 ICT graduates overall.⁸⁰ It is initiating E-Mongolia, e-Government, and e-procurement projects, rendering public services over the Internet, raising PC penetration rates through a Low Cost PC program, and making Internet connectivity more affordable for Mongolian citizens through the *1 Tugrik* dial up connection program. Eventually Mongolia could become an outsourcing center for telecoms and software.⁸¹ The Korean government has pledged money for an e-capitol, e-city project in Ulan Bator, building out broadband hardware and networking infrastructure. The telecoms sector has a vibrant mobile cellular duopoly, and a third license for a 900MHz GSM service will be issued soon.

Mongolia also has weaknesses. It is difficult for ICT startups to raise money as the venture capital market is non-existent.⁸² IPR violations are rife.⁸³ There are few licensed ICT professionals in Mongolia, those who have passed certification exams administered by the likes of Red Hat Linux or Microsoft or Cisco (CCIE).⁸⁴ These certificates are an important badge of recognition, for example for firms that want to engage in the international ICT outsourcing market. And Mongolia is still a small market, constrained by the size of its population and their low purchasing power. One-third of Mongolians live below the poverty line, earning less than 20,000 tugriks a month (around USD20).

⁷⁹ ICT can be a powerful tool in shaping Mongolia's response to a series of weather related disasters and minimize their devastating impact on the local herder economy. Severe snowstorms (called 'dzud') in 2000 and 2001 devastated the nation's main industry of nomadic stock breeding, slashing the number of livestock from 33.6 million in 1999 to 23.9 million in 2002. A company named Agrosoft is using satellite remote sensing imagery and GIS software to map grazing vulnerabilities and make recommendations to the government.

⁸⁰ In 2003 there were 338 IT university graduates, of which 194 were software engineers, 90 electronic engineers, and 54 others. But demand far outpaces supply. Short-term Web design and page layout classes, such as those offered by the Mongolia Development Gateway (MDG) (www.mongolia-gateway.mn), are becoming increasingly popular. A one-month course with the MDG costs 45,000 tugriks (less than USD40) for 48 hours of instruction.

⁸¹ GrapeCity <http://www.grapecity.com/mongolia/default.htm> makes software for Japanese companies.

⁸² In order to address the problem of company owners and their limited access to affordable, longer-term financing, the World Bank issued in June 2005 a new USD10.57 million no-interest loan for Mongolia, to provide capital for selected commercial banks to lend at market rates to private businesses.

⁸³ There is an agency under the Ministry of Justice tasked with IPR monitoring and registering copyrights under the Patent Law. Mongolia has revised its patent and copyright laws with a view to complying with the WTO Agreement on TRIPS and adopted the Law on Joining the World Intellectual Property Organization (WIPO) Copyright Treaty, and the WIPO Performers and Phonograms Treaty.

⁸⁴ In Mongolia such an examination is not possible but one can get the materials needed to prepare. There is a supply of books and CDs. ISP MagicNet pays for its employees to take the test overseas, and takes care of the exam fee. Employees get a chance to up by 4-5 times their salary, to a level of USD1000-2000 a month, upon a successful mark. If they fail, they pay MagicNet back.

Policy, Law and Regulation

Strategic Policy

In 2000 Parliament approved ICT Vision 2010 which called for the government to reform ICT sector governance, its regulatory structure, and the general enabling environment. The structural reforms and institutional changes that have taken place since then are offshoots of the general policy directives laid out by ICT Vision 2010, and updated by the 'Economic Growth Support and Poverty Reduction Strategy Paper' published by the Ministry of Finance and Economy in 2003.⁸⁵ With funding from the World Bank, Mongolia has also expended considerable energy around e-signature, e-commerce, and e-transaction regulations. The Prime Minister's office has introduced an e-government initiative to support the use of ICT in the delivery of public services as a way to compensate for Mongolia's widely dispersed population and manpower limitations.⁸⁶ 'E-Mongolia', the government's ICT development policy strategy (still under draft), proposes that '15 per cent of the government intranet web portal is [to] provide single point access to government information and services for the people on 24/7 basis.' The UNDP is working on an e-government report which it has handed over to the Mongolian government for final comments. But it will be difficult to show immediate concrete actions or results as there are numerous legislative procedures before a policy can be enacted into law.

The two key governmental agencies, involved in the promotion of ICTs in Mongolia, are the Communications Regulatory Commission (CRC) and the Information and Communication Technology Authority (ICTA), established 2004 and which has devised a comprehensive E-Mongolia strategy.

Strategic Framework: Telecommunications

The Communications Regulatory Commission (CRC) was established as an independent regulatory body in the 2002 Telecommunications Law as part of a move to liberalize and open up the telecoms sector to competition. It employs 39 staff and operates on an annual budget of USD350,000.⁸⁷ Major decisions in the telecoms sector are taken by the CRC committee, which has seven voting members. The committee's composition has come under fire because it forms a 'closed circle,' with no outside representation from NGOs, consumer interest groups, impartial academics, or telecom user groups. This has led many to question the CRC's independence.

⁸⁵ The guiding principles are (1) Establish the appropriate policy, legal and regulatory framework; (2) Develop the telecommunications and information infrastructure necessary for providing access to reliable and affordable connectivity; (3) Establish a framework for the utilization of ICTs in governance and other applications; and, (4) Develop human resources to effectively utilize ICTs.

⁸⁶ To facilitate e-government, there will be the appointment of an Administrative Reforms Committee (ARC) by the end of 2006, to be drawn from the highest level of authority that is capable of implementing changes in the Government administrative system, to propose and implement administrative reforms. The ARC will have a Sub Committee on ICT. [E-Mongolia draft]

⁸⁷ The 39 staff are distributed across four departments: regulatory, radio frequency management, tariff and interconnection, and law and administration. With the help of the APT, the CRC has drawn up a new numbering plan 'to formalize an [existing] informal agreement with the operators.' The CRC has regulated 60 standards and issued 30 regulatory documents.

Access, especially in rural areas, and affordability remain two challenges. For example, a USD1 million sponsored JICA rural development masterplan lacked the necessary funds for an execution phase. 'Currently *aimags* and *soums* are connected through 30 thousand km long airline, 900 km long digital and 2100 km long analog radio relay line, and 4200 km long fibre cable line. 332 communicating stations with a capacity of 131 thousand telephone lines are also in use. Fifty-five per cent of all stations have digital technology.'⁸⁸ But there are positive developments in infrastructure investment, in part facilitated by a messy and chaotic licensing free-for-all scheme overseen by the CRC.⁸⁹ A relatively high number of new licenses have been handed out, in broadcasting, in new wireless broadband technologies, and in 'disruptive' fixed-wireless convergence technologies. There are around 14 TV licenses issued, with six in operation, and another three to four to be operating over the coming several months. Ten WiFi & WiMax licenses have been handed out. Complaints have been aired that such a small market as Mongolia cannot sustain a large number of players, and that future private investment in infrastructure will be damaged.⁹⁰ Competitors have been angered by the recent WLL application from a company named CityPhone, and question its legality. In its application for a WLL license, CityPhone made no mention of what technology it would use to convey its service. It has started to install a PAS/PHS system 'that looks a lot like a mobile service and not WLL.'⁹¹ The Information and Communication Technology Authority (ICTA) has stated that WLL can only be used for fixed purposes and in the suburbs of Ulan Bator (UB City).

Interconnection continues to be a contentious issue.⁹² Even though not directly specified by law, CRC insists that companies must follow its decisions on interconnection. Despite the flurry of network construction, it is still difficult to interconnect different networks. Mobile to fixed interconnection, in particular, is worrisome, with some accusing the government of imposing 'strange rules'. Mobile phone companies recently cut their airtime tariffs by 25 per cent and, in return, they want the government to renegotiate the interconnection tariff with Mongolia Telecom. Another issue is VoIP. The CRC is considering taking all licensed IP telephony providers in Mongolia and making them cross-connect under one single roof, through one 'big server', to put a floor on IDD termination charges, the traditional means of subsidizing rural access.

⁸⁸ See <http://www.imf.org/external/np/prsp/2001/mng/01/063001.pdf>

⁸⁹ To accelerate infrastructure deployment in the countryside, the E-Mongolia draft states the following outcomes to be achieved, (1) Connection of all aimag centers by high speed transmission links, (2) Connection of all soum centers by digital transmission links, using a mix of optical transmission links, wireless digital transmission links, and satellite connections.

⁹⁰ The CRC acknowledges the problem by saying they 'can't seem to stop anyone, even if they don't have a license.' But its mandate contains an inherent conflict as the CRC wants 'to promote sectoral development... By law our main strategy has been to throw the market wide open, please come in.'

⁹¹ Similar to what fixed telecom giant China Telecom deployed, under the brandname of Xiaolingtong, in competing with the mobile cellular offerings of China Mobile and China Unicom.

⁹² On the other hand, spectrum management seems to be holding up well. The 2.4-2.5 GHz range has been fully distributed and new entrants are clamoring for 3 GHz and 5 GHz capacity.

The Mongolia Telecom privatization process seems to have ground to a halt.⁹³ Mongolia Telecom is in a difficult situation. Not only have the IP telephony providers plundered Mongolia Telecom's IDD market share but local tariffs have not been rebalanced.⁹⁴ Mobile phone operators Mobicom and Skytel offer competitive domestic long-distance tariffs, and against expectations Mongolia Telecom was unsuccessful in its bid for the third mobile license. The position of Mongolia Telecom is further complicated by the fact that it is 40 per cent owned by Korea Telecom which may have a different view from the government on the future of Mongolia Telecom. Yet a further complication is that Mongolia Telecom leases network assets from the Mongolian government, and much of the national backbone has been financed by donor aid (Germany's KfW, ADB) which leaves a question mark over the future ownership and control of these assets.

A Mongolian ISP Association (MISPA) was established as a non-profit with a focus on developing the Internet business environment in Mongolia. The ICTA wrested control of the MISPA and has power over who can join, who cannot. MISPA members have the right to use international fiber access to Russia and China (at a cost of USD2,500 per 2Mbps), non-member ISPs have no such right. The ICTA is also involved in administering the Universal Service Obligation Fund (USOF) and maintaining the domestic national backbone network.⁹⁵ Legal and regulatory frameworks for the USOF still need to be established. E-Mongolia calls for 10 per cent of rural population of Mongolia to benefit from enhanced communications services through USOF.

Strategic Framework: TV and Radio

State control of the media has been banned since January 1, 1999, but the transition of the state press to the private sector and the formation of a public broadcasting corporation are not yet complete. There are 7 AM, 62 FM, and 3 shortwave radio broadcast stations. There are 52 television broadcast stations, plus 21 provincial repeaters and many low power repeaters.⁹⁶

Mongolia tried to establish an independent public broadcasting board in 2005 to control Mongolia's state-owned radio and television station, the Mongolian Radio and Television (MRTV), but the effort floundered.⁹⁷ Parliament passed a law on July 1, 2005 to change MRTV from a state-run to a public service broadcaster. The aim is to give the national broadcaster greater freedom from government control. The law also makes it dependent

⁹³ Depending on how the government splits Mongolia Telecom up and what assets it leaves Mongolia Telecom with, there are 3 options: (1) Mongolia Telecom could become a services company and not own any assets, (2) Mongolia Telecom could own switching facilities except for the main tandem switches, (3) switches and secondary cables (for last mile) could be loaned, transferred to Mongolia Telecom, with the government taking charge of the transmission backbone, international, and primary cable, the main transmission routes and inter-exchanges.

⁹⁴ Government has 54 per cent share in Mongolia Telecom but is finding it politically difficult to raise the local tariff.

⁹⁵ For which it receives USD2.5 million dollars through the state budget, monies that come from what Mongolia Telecom pays the government in leasing fees. The World Bank has committed USD7 million to the USOF.

⁹⁶ CIA *World Factbook* 2004

⁹⁷ A Public TV corporation which would enjoy editorial independence, similar to the BBC in England. But government is reluctant to cede control.

on public funding and bars it from carrying commercials - until now a major source of revenue. However, differences in parliament have caused a delay in ratifying the appointment of a new 15-member national council to oversee MRTV. MRTV enjoyed a monopoly until 2000 and is still the only TV channel to cover the whole country. But it now has to compete with at least five private TV stations in the capital city alone, with other channels in different regions (like UBS RGB in Darkhan). In July 2004 the opposition Motherland Democratic Coalition (MDC), angry about being denied air time, took over the state television briefly to demand on air that election results be recognized.

Radio stations (with a radius of 15-22 km on FM wavelength) have flourished, especially in the countryside during election time when political parties are keen on getting their message out, and radio is seen as 'an ideological weapon to win the next election.'

Strategic Framework: IT

The Mongolian government has developed an ambitious E-Mongolia program, consisting of 16 projects, in part to move from an infrastructure only focus (a supply side emphasis) to application and usage driven growth. The program includes the assembly and sale of a low cost computer to boost PC penetration rates, as part of a goal to computerize 70 per cent of all households in the next five years ('Computer for Families') and to connect 50 per cent of them to the Internet. Other E-Mongolia initiatives are e-education, e-medicine,⁹⁸ e-customs, and IPv6 pilot projects. A final draft of the E-Mongolia directive awaits submission to Parliament for approval, and the concept will require the backing of a strong publicity campaign to build awareness.

The Information and Communication Technology Authority (ICTA) was established in 2004 to implement the E-Mongolia program and push Mongolia toward a free market, high technology economy. The ICTA used to be one lone department under the Ministry of Infrastructure. Its main activities include developing ICT policy, harmonizing all ICT functions among the different sectors of Mongolian society and economy, and developing appropriate laws and deal with legal issues. It has 10 staff in the policy planning department, 10 in implementation, 10 in administration, and another 10 staff running the ICT Development Center.⁹⁹ The ICTA envisions the E-Mongolia project costing around USD150 million till the year 2012.

The National Identity Card Project (NID) has been selected as one of the first E-Mongolia initiatives to be implemented. The government plans to substitute 17 kinds of

⁹⁸ A telemedicine project links six locations to the Third Hospital to transmit chest X-rays taken in those locations to the Third Hospital where they are reviewed by the country's leading cardiologists, who then send their diagnosis and advice back to the doctors at the six locations. http://www.digital-review.org/05_Mongolia.htm

⁹⁹ ICTA has received 3 fellowships from South Korea for the study of ICT sector project management, telecommunications sector management, and the economics of telecommunications (including how to coordinate, calculate, and regulate tariffs). The E-Mongolia draft calls for the establishment of 'an ICT Experts Committee underneath of ICTA that will provide advisory input to the ICTA and Prime Minister on ICT policies and decision making. Membership of the Committee [is] to be drawn from the representatives of government, industry leaders (both ICT suppliers and users), professional associations, [and] Think Tanks.'

document including passports, drivers' licenses and bank deposit books. Crimes like theft could be prevented with citizens' personal information stored in the high-tech cards along with their fingerprints. The national smartcard will also allow the government to register 'every citizen, every asset.'¹⁰⁰

But the policy implementation process is lengthy and time consuming. The NID working group is headed up by the Ministry of Justice. Under the working group's remit, it must handle several draft projects that require coordination among different ministries, and it falls to the ICTA representative to 'harmonize and integrate' the policy.¹⁰¹ A tender must be drafted, conditions applied, and everything submitted to Parliament for discussion and approval. The ICTA is considering creating the position of CIO (Chief Information Officer) in every line ministry, and under every local government, with an open line of communication to the ICTA.

One difficulty both ICT planners and private companies face is the lack of good data. Resources to carry out such work are scarce, and so is trained staff. On the other hand, there is a 98 per cent literacy rate in the country. The higher-education system has expanded from seven to more than 200 colleges and universities. The Ministry of Education set a goal that by 2002 each secondary school should have at least two PCs, now there are more than 10 PCs per school. Many of these computers are used ones imported from Japan and Korea, but in tolerable conditions. All schools at the prefecture level are connected to the Internet via dial up, but village schools often lack basic amenities like electricity.¹⁰² The MoE is launching an education TV channel in September and mailing out courses on CD-ROMs. There is a possibility of receiving funding from the US Millennium Goal to advance IT literacy in schools and train teachers through a technical assistance grant.¹⁰³ The Mongolia University of Science and Technology runs a Computer Science Management School. The UNDP is planning a 3 year, USD1.5 million Enterprise Mongolia program which will do capacity building, business development, micro financing, and policy counseling. UNDP might collaborate with vocational education and training (TEVT) centers in rural areas of Mongolia. 2005 has been earmarked as the National Year of SMEs in Mongolia.

Strategic Framework: Investment

Mongolia is reforming the tax system, licensing, registration, FDI regime, and shoring up the private sector. The business environment is becoming more predictable and transparent, as Mongolia joined WTO in 1997 to integrate into the global marketplace. The importation of computer components and PCs is exempt from VAT and custom duties, and the country imports roughly 5,000 PCs a year. The two-tier tax system has been lowered, with the top tier paying a corporate income tax rate of 30 per cent instead

¹⁰⁰ The Mongolian government wants to improve its information collection and tracking capabilities. Currently, 'all capital is not registered,' making an evaluation (for tax purposes, etc.) difficult.

¹⁰¹ In an environment where local government networks, such as the taxation and customs networks, are not integrated, and where sharing of network resources seldom happens. To remedy the situation the E-Mongolia draft calls for the 'establishment of unified coding system and integrated addressing system.'

¹⁰² Working with Datacom, the US National Science Foundation funded free Internet access for Mongolian universities with a grant for two years. But when the grant expired so did the service.

¹⁰³ Go to www.mca.mn for more details on the Millennium Challenge Account MCA Mongolia Proposal.

of the previous 40 per cent. The lower tier continues to pay 15 per cent. The cutoff line between the two tiers is 100 million tugriks in profit (or USD100,000) which is likely to be raised to USD500,000. The number of licenses required to operate a business in Mongolia has been reduced from an astounding 600 to 82. Depending on the license, the maximum number of procedural steps is 10. In 2003, registration was reduced from 60 days to 14 days for foreign companies. The process takes 2 steps. First the company must acquire a foreign investment certificate for USD12 from the Foreign Investment and Foreign Trade Agency (FIFTA), then with this document in hand the company can obtain a business entity certificate, tax registration number, official company seal, and open a company bank account for tax purposes at the State Taxation Registration Bureau.

The Foreign Investment Law was one of the first laws in place, when Mongolia made the transition to a market economy, back in 1991. In 2004 committed FDI was USD240 million, and the trend is upward. Foreign investors enjoy preferential treatment and incentives, such as tax breaks, denied to domestic investors. An export-oriented company is exempt from corporate income tax for 3 years, the tax exemption is 10 years for an investment in infrastructure, and 5 years for an investment in the chemical industry. Mobile cellular operator Mobicom, in its first five years of operation, had no income tax to pay, from years 6-10 it only has to pay 50 per cent of tax. This is applicable to Skytel and the 3rd mobile operator as well. Mobicom has ploughed USD60 million of investment back into its Mongolia operations. Foreign owned companies are also exempt from paying customs duties and VAT.¹⁰⁴ There are concerns about unnecessarily handicapping capable Mongolian companies and fears that foreign companies are prone to relocating (at a moment's notice) depending on the vagaries of the global economy.¹⁰⁵

The Mongolian Chamber of Commerce publishes a Red Tape Index which denotes the prevalence of corruption. Over the last two years, numerous procedures and administrative barriers have been cut, as the state moves to a one-stop service mode. Overlapping inspections (national level inspection, municipal level inspection, and district level inspection) for items like mobile phones and PCs have been streamlined. But the Transparency International 2004 corruption survey of 146 countries placed Mongolia in 85th place. Mongolia was placed 43rd in the 1999 survey, which covered over 80 countries, showing an increase in corruption over the past five years.

Financiers do not view ICT sector as a profitable one to invest in, compared to say the real estate sector. Their outlook is short term, looking for a quick turnover, and an even quicker exit. Most IT startups raise funds from family members and do website development work on the side. As such, they prefer to keep hidden their finances, for fear of getting taxed, and are reluctant to divulge such information even to potential

¹⁰⁴ Most imports enter Mongolia either duty-free or subject to a uniform tariff of 5 per cent. There is a VAT 15 per cent, for a total of 20 per cent. (This can be seen as inducing some smuggling.) There are few export duties, only on items like raw materials and cashmere.

¹⁰⁵ There is a growing distinction on quality as opposed to runaway investment. Lots of outdated equipment in China was sold to Mongolia, and found a final resting place here. Skytel's first mobile venture was an antiquated AMPS system shipped from South Korea where use of the equipment had been discontinued.

backers.¹⁰⁶ Perhaps the major problem in this area is not the laws of Mongolia which in fact stand up quite well to international standards, but the daily changing interpretation of those laws. One NGO complained that 'in Mongolia you don't have rule of law but rule by law.'¹⁰⁷

The Korean government has funded an IT park in UB which acts as an incubator, a novel concept in Mongolia which has had difficulty finding wider acceptance.¹⁰⁸ The IT park is about to graduate its first cohort of 10 companies this September. Forty per cent of the IT park's annual budget of USD200,000 comes from the national treasury, but the remainder must come from its own efforts.

Technology

Technology: Telecommunications

The eastern part of Mongolia has optic fiber, finished 4 years ago, the northwest has some fiber, the western part has a digital microwave transmission link of 34 Megabytes run by Mobicom, and to northern Mongolia there is a digital microwave transmission link built 8 years ago. Additionally, the Mongolian Railway (or Railcom) has built a north-south fiber network following the railroad; this is fully digital and represents nearly 1500 kilometers of fiber. As a result of all this construction, 90 per cent of connections from Ulan Bator to the aimags are digital. In the south, two aimags remain connected via analog microwave. However, all aimags are connected via VSAT. Satellite and VSAT services are provided by Mongolia Telecom, Incomnet, and MCS, driven in part by a need to connect mining camps, truly remote areas where no other technology is available, and by national banking and treasury networks which have key data to transmit. Below the aimag level, there are 320 soums (with typical populations of 2000 or much less) connected to aimags via open wire and 40 soums via analog microwave. Open wire consists of stringing copper wire from pole to pole - wooden poles attached to special concrete poles as support - over many kilometers (100-200-300), from soum to soum.

There is new network construction activity, centered in UB City, as companies deploy fiber rings and even unveil a USD10 million fiber-to-the-building project.¹⁰⁹ In what

¹⁰⁶ The informal sector, of which ICT startups are part of, is quite large in Mongolia. According to USAID estimates, it comprises anywhere between 17 and 35 per cent of total GDP.

¹⁰⁷ 'According to the law, one must go to this place and pay for this and that, one has no choice, one must pay money to a private organization (an audit company) because you need some document (for example, to start a business). You have to go to this one company when in theory you should be able to go to any certified company to get the document notarized. If you don't, your application won't be accepted.'

¹⁰⁸ '2 years ago, when we came up with the concept of (an incubator), of leasing free office space and discounted Internet, people were genuinely surprised... "Why support such private companies? They should be able to grow by themselves." Not many people back then understood the incubation function.' (Director, IT Park). Company performance is monitored and evaluated every 6 months. With the Japan-based Center for International Computerization Cooperation, IT park offers one month computer courses. It also offers a two week software project management course, teaming with the Korean National Internet Development Agency.

¹⁰⁹ Some view these developments [the 'hardware approach'] with a jaundiced eye, and doubt whether any of the companies putting in such infrastructure will ever realize a return on their investment in the next 10-15 years. But 'if a rich man wants to spend his money like this... Even rich cash flow companies in the US and Europe are at a loss [after putting in much fiber], and they've got rich customers.'

promises to be Mongolia's 'first real broadband network,' MCS is doing a two-year fiber implementation covering all UB districts, major buildings, hotels, schools, and government houses. But ISPs will be responsible for installing DSL equipment and the 'last mile'.¹¹⁰ The CRC is processing two further applications for fiber networks, one a 100 per cent owned FTTH Korean venture in UB City and another a Korea-Mongolia joint venture to finish networks in Mongolia's next two biggest cities.

Technology: TV and Radio

About 60 per cent of homes in the capital city of Ulan Bator receive cable television. Parliamentary meetings are directly broadcast to the public over Sansar's CATV network. There are five major cable TV providers in Mongolia, these are Hiimori, Sansar, SuperVision, Manai Delgets, and Minii Mongol operating in UB City and several others in the four main cities. CATV is provided to more than 80 thousand households and two companies are reported to have started wireless TV distribution services.¹¹¹ Magicnet, an ISP, has begun a project to deploy cable modem Internet and is cooperating with domestic cable TV companies. They have just completed a successful test in Ulan Bator with Sansar TV using its fiber and co-axial network. Magicnet plans to deploy a cable modem service to Ulan Bator homes and apartments later in 2004. Their customers eventually will be able to make voice calls over the cable infrastructure. If the collaboration with Sansar goes well, Magicnet plans to extend deployment beyond Ulan Bator by working with other regional cable TV companies. On the radio side, FM radio station InfoRadio 105.5 (www.inforadio.mn) distributes content over the Internet and one TV station (www.tv5.mn) has been reported to broadcast over the Internet.

Technology: IT Hardware

ICTA has worked closely with a handful of companies to expedite the E-Mongolia project. Two companies, in particular, have featured prominently, MCS Electronics and Sky C&C (a joint venture between Korea's SK Group and a Mongolian partner). Sky C&C has deployed a WiFi network in government buildings connecting officials to the Internet and has been contracted by the ICTA to develop an e-government masterplan, of which the USD16 million NID is one of four priorities. The other big project costing USD5 million is the building of a datacenter and centralized database for the government. An e-government portal is seen as less of a priority at this stage. Sky C&C's involvement is regarded by some as an incentive for pro-active Korean governmental agencies to offer financial assistance, such as the Korean International Cooperation Agency (KOICA) or the use of EDCF funds from the Korea Ex-Im Bank. NID technical platform will provide a working IT architecture that can be expanded into other government realms, like taxation, licensing, and intelligent traffic systems.

¹¹⁰ MCS will have 5 Giga POPs. It envisions that its major customers will be local ISPs, cable TV companies, mobile operators. It runs an IP VSAT network to cover the rest of the country, over which it currently does a government videoconferencing service (with some ADB co-financing), 156 kbps to 24 sites, at a monthly cost of USD280 per site.

¹¹¹ <http://www.apdip.net/projects/dig-rev/info/mn>

Technology: IT Software

Intel and MCS have a proposal for targeting SMEs and their IT literacy, called 'ICT for All.' They are working with the World Bank and ADB on how to help introduce IT to SMEs. It is a similar project to what the World Bank is doing in Malaysia and India, offering SMEs a packaged solution of financial accounting, corporate network, PC equipment, and Mongolian-language software. The proposal is not finalized yet as MCS negotiates with local banks on how to implement it, and hopes to realize it by the end of 2005. The proposal dovetails with the government's plan to foster and expand ICT application in enterprises and SMEs, in part, by setting up Digital Community Information Centers (CIC), or 'telecentres,' for citizens and businesses at bag, soum, aimag levels and ICT SME showcases.

As in most Asian economies, pirated software predominates except in international organizations. Web companies frequently use open source in their work. The use of free email services such as Yahoo! is widespread and there are numerous online communities. One local company that has established a reputation for itself is GrapeCity which employs high quality engineers and has done some software outsourcing work for Japanese and Chinese clients, including work on a banking application. Software work not only requires talented programmers but also good project management skills, as 'software development is like a factory container system (an assembly line), you assemble, do marketing, research, testing, and document development.' Few Mongolian companies possess this combination of skills as many of them are family run SMEs without technical knowledge. One constraint on local developers is that government projects require an applicant to have significant international experience.

Markets

Market: Telecommunications

Mongolia Telecom (Mongolia Telecom) is the dominant fixed-line operator in Mongolia, with 130,000-140,000 subscribers.¹¹² Mongolia Telecom was structurally separated out of the Ministry of Infrastructure in 1992 and, in what was billed as the first stage of privatization, Korea Telecom (KT) took up a 20-year, 40 per cent stake in Mongolia Telecom for USD4.5m in 1995. Mongolia Telecom has been a very profitable company throughout most of the 1990s but with the advent of mobile competition, international

¹¹² Mongolia Telecom (Mongolia Telecom) has been one of the prime beneficiaries of grant aid because that aid has mainly poured into Mongolia's fixed network assets, funneled through the auspices of the Post and Telecommunication Authority (PTA, now known as ICTA). This is a result of a rather unique proviso, under which Mongolia Telecom does not actually own the fixed network assets but leases them from the PTA, a government agency, and pays the Mongolian government an annual fixed charge. Mongolia Telecom then markets various services, from voice to leased circuits to Internet access (through its subsidiary company Micom). The percentage that PTA gets is not derived from Mongolia Telecom's revenue, nor from Mongolia Telecom's profit, but from a percentage of the assets. (Mongolia Telecom has also invested itself in some network assets, using its own internal resources to finance a wireless local loop project that has 10,000 subscribers.) The lease agreement is calculated based on the following formula: if the asset is a local network asset, the PTA receives 7.5 per cent of the asset value; if the asset is a national network asset PTA receives 7.45 per cent; and if it is an international asset PTA receives 12 per cent of the value. Rapidly dwindling returns on IDD has caused some friction between the PTA and Mongolia Telecom, which is not particularly happy about paying the PTA a high rate of 12 per cent on its international network assets.

VoIP competition and later on the substitution of international SMS for voice, its profit margins have been shrinking fast.

Prepaid cellular wireless has been a great success (97 per cent of users) with around 450,000 subscribers, mostly in UB City. Japan-backed (KDDI and Sumitomo) GSM provider Mobicom has 80 per cent market share while Korean-backed CDMA Skytel has the rest. The operators feel that the market is far from saturated, and that the one million-subscriber penetration level is attainable. Mobicom has begun a service push into the countryside, with coverage in all 21 aimags, and (despite transmission difficulties) an expansion to the soum level. Mobicom unveiled wireless data services in February 2005 riding on top of a GPRS network and has 30,000 subscribers. Tariff is 1 kilobyte, 2 Togruts. SMS is 2 US cents, MMS 10 US cents. ZTE installed 30,000 lines of CDMA2000 1x equipment for Skytel in 2004. Mobicom has a digital microwave backbone network to reach the west and south sides of Mongolia but it has decided to go ahead and put in its own fiber network along the Mongolian highway. Besides these developments there are satellite and VSAT services, provided by Mongolia Telecom, Incomnet, and MCS, driven in part by a need to connect mining camps, truly remote areas where no other technology is available, and by national banking and treasury networks which have key data to transmit.

On tariffs, for mobile postpaid there are many promotions but the general price is about 6-10 US cents a minute (65 - 108 tugriks). Mobile prepaid is US 20-30 cents (215 - 323 tugriks) a minute. The fixed monthly subscription fee is 5,000 to 10,000 tugriks (USUSD4.5 - 9.0) a month. Mongolia Telecom's local tariff is a very low 7 tugrik a minute or 0.007 US cents. (Before it digitized its network in mid 1990s, the tariff was 2 tugrik a minute.) Long distance is almost 50 cents (539 tugriks), depending on the area. Calls from Ulan Bator to 'very near' cities cost 20-30 cents a minute. VSAT operator Incomnet charges 140 tugriks (13 US cents) a minute but field equipment costs USUSD7000-7500. So the use of a cellphone is more attractive for making long distance calls. Wireless local loop calls are between 50 and 200 tugriks (US 5 – 19 cents) a minute.

There are 6 ISPs, and 50,000 registered Internet subscribers.¹¹³ Micom, the ISP arm of Mongolia Telecom, runs the Internet Exchange (IX). Broadband wireless Internet connectivity is costly at USD50 per month but the bandwidth download limit of one Meg has been lifted. ISPs have focused on access and want to broaden their revenue streams by moving into integrated services. According to Datacom, there are 2000 Mongolian companies with websites.¹¹⁴ ISP MagicNet has 1000 websites registered with it, but only 300 are very active. The E-Mongolia draft calls for the number of active and dynamic websites to reach 3000, partly by reducing the price of .mn domain names. Interestingly MagicNet noted that domestic IP traffic has risen considerably, accounting now for slightly more than half of all IP traffic. Traffic is driven by local 'information delivery

¹¹³ Bodicomputer acquired a majority share in Magicnet, reducing the number of ISPs from 7 to 6. There are many more users than subscribers, with users numbering 142,000. Majority of users are dial-up.

¹¹⁴ A number of Mongolian companies host their websites outside Mongolia, for instance in a country like Germany, for better accessibility on the part of potential clients.

sites', in part popular with overseas Mongolians who want to keep connected to their homeland, and by business sites run by international aid organizations and businesses for internal and external communication purposes.¹¹⁵ Domestic companies use the Internet for information retrieval. To promote Internet use, the ICTA is pushing a 1 Tugrik a minute connection for dial up access to the Internet. Currently the dial up fee is the same as making a local phone call, or 10 tugriks per minute. The ICTA wants to reduce that to 5 tugriks a minute during the daytime, and 1 tugrik at night for Internet.

Railcom has become an important provider of dedicated data circuits to ISPs, breaking Mongolia Telecom's stranglehold on the market.¹¹⁶ But international bandwidth capacity is still constrained, with Railcom operating at an STM-4 level, and facing a large investment step if it wants to put in DWDM equipment. The North-South fiber route, connecting Mongolia to Russia and China, is optimistically seen as a potential revenue maker for the carriage of (trans-Mongolia) international data traffic between London (Europe) and Hong Kong (Asia).¹¹⁷ As elsewhere, the Chinese are making their presence felt. Huawei and ZTE are the 2 biggest equipment vendors.¹¹⁸

Markets: TV and Radio

There are at least six TV stations operating and several more expected to start up. Mongolia Radio & TV (MRTV) enjoyed a monopoly until 2000 and is still the only TV channel to cover the whole country. But it now has to compete with at least five private TV stations in the capital city alone, with other channels in different regions. One of these private TV stations is the Eagle Broadcasting Company (EBC). Eagle Television was the first television station run jointly with American and Mongolian investment, but it is now under 100 per cent ownership by an American NGO, the 'AMONG' Foundation. In 2004 it resumed broadcasting after more than a year off the air after a dispute between the American and Mongolian partners over finances and control. Cable TV is available at USUSD3 a month for 40 channels. Magicnet plans to offer cable Internet for USUSD60 a month. Magicnet believes there is a market for cable Internet aimed at SMEs and SOHOs. By 2005, it expects to have 1000-3000 customers.

Markets: IT Hardware

The Mongolian government negotiated with Intel to get a favorable price on Celeron chipsets. The government is working together with several companies, including MCS Electronics to implement the Low Cost PC program. Parliament was lobbied to lift VAT

¹¹⁵ In 2003, there were 3,200 registered NGOs in Mongolia employing over 12,000 people. Many international organizations have private corporate networks to Singapore, Australia, Canada, US for database exchange and secure (IP) phone between HQ and branch offices.

¹¹⁶ Cost is distance based, long or short. 4km, USD100 a month for fiber, depending on equipment. To Darhan, USD1000-1500 a month for dedicated fiber circuit. Internationally, it is competitive, fiber to Russia or China, one E1 USD2500-3000 a month, or satellite Internet access, 1 Meg USD1500-2000.

¹¹⁷ A consortium of Russia's Transtelecom, Mongolia's Railcom and China's China Unicom plans to invest USD100 million to buy DWDM equipment, or dense wavelength division multiplexing, to increase the transit capacity of their Europe-Asia network. In May 2004, the companies launched the project to connect their networks to transmit data from Europe to Asia.

¹¹⁸ Favorable vendor financing terms play a role here, backed up by the China Ex-Im Bank. ZTE is participating in the construction of a CDMA450 WLL network, which will cover 710,000 people in the pasturing areas.

on computer parts. MCS imports PC parts from Singapore, Malaysia, and Taiwan, assembles them locally, and sells the finished product under a local brand. At USD250 per PC, it is still quite expensive for the average Mongolian family. Local banks have offered a one-year financing package, where 20,000 to 30,000 tugriks a month is debited from one's salary to pay off the PC. Since the middle of June 2005, 2500 such PCs have been sold. Before the program, the annual sale of PCs in Mongolia for the past 4-5 years was 12,000, with imports accounting for 5,000.

An ICT exhibition for companies to display their wares has been held in UB in the past and there are many local exhibitions at the IT Park. But few if any IT companies are members of the Mongolian Chamber of Commerce. Many companies act as resellers and distributors for foreign equipment manufacturers, to 'localize' brands like Canon, HP, Dell. Wireless products are popular.

Markets: IT Software

There is small but thriving market for ICT consulting services, such as setting up a Local Area Network (LAN), installing productivity software, buying the right kind of PC. About a dozen companies build, host, and maintain Web portals, do software system implementation work for mining companies, energy utilities, and banks. For example, a local company Infocon built a portal site for English training (www.toefl.mn) and did a recent job for a rural medical college, helping them with LAN cabling, and replacing the few poor quality PCs. Most companies survive through referrals, word of mouth, their websites, previous clients, and participating in workshops. Larger companies do turnkey projects, much of it funded by organizations like the ADB, World Bank, and Germany's KfW, to improve school infrastructure and provide regional hospitals with telemedicine facilities.¹¹⁹ Datacom, a local ICT company and former ISP, is working on an e-commerce application where they do a billing platform for real estate management companies that allows up to 80,000 apartment rental fees to be collected electronically. The service has been expanded to include monthly electricity bills. Datacom is working with the mobile operators to fulfill their monthly telecom bill payments, and negotiating with organizations to allow for people to use their email address as a credit card number.

There is plenty of opportunity for enterprising people to start their own software businesses, although they remain SMEs. For example, young Mongolian entrepreneurs have created a content aggregator to address the local content problem. They are not making a lot of money but showing initiative and enthusiasm. They are collecting Mongolian content in every aspect and putting it on their site, www.olloo.mn, which sounds like 'found it' in the Mongolian language, a local Google! The IT park director noted that one of their more successful software tenants was founded by a young man deemed to be an average performer as a university student. But he had that

¹¹⁹ Facilities for hospitals and universities include low cost laptops and wireless networks. MCS did a government financial management and general treasury information system (MIS) with IBM to manage cash flows for 3500 governmental agencies. The World Bank financed the project for the Ministry of Finance.

'entrepreneurial spark' and knew how to work with a team. His company has gone on to produce 3 successful software products in the past 2 years.¹²⁰

¹²⁰ Mongolian language spellchecker, dictionary, and a computer performance monitoring software.

Tajikistan¹²¹

Tajikistan has a small population just over 6 million scattered across mountainous terrain of thin sun-scorched soils. The country emerged from the Soviet period with the least developed telecommunication system of the Central Asian republics only to suffer its almost complete destruction during a destructive civil war, 1992-1997. 'Poverty in the country stands at a staggering 80 per cent of the population.'¹²² Unlike Kazakhstan and Uzbekistan, the state sector is far less developed economically and infrastructure is more basic, but for this very reason also a small private telecommunications sector in mobile cellular and Internet services is playing a relatively more significant role vis-à-vis the state sector than in the other republics. This is likely to continue to be the case with further liberalization planned for 2006 ahead of WTO candidacy and can be turned to Tajikistan's advantage. The main drive of public funding is likely to be the construction of a modern national trunk backbone network that will go hand-in-hand with a very necessary national road building programme, a programme that will take some years to complete.

In 2002 teledensity was just 3.7, or around 240,000 subscribers with a telephone capacity of just under 300,000 direct exchange lines. This is below the level of nearly 270,000 at the outbreak of the civil war. In areas where telephony is available the waiting period in 2003 was at least 6 months, usually because of insufficient cable to make the local connection. The situation had not changed much by 2005, the number of fixed line subscribers now being around 260,000, due to the emphasis being placed upon upgrading and digitalizing the telephone network, while mobile cellular subscribers had reached over 240,000 (a tenfold increase over 2003) and are soon to overtake fixed line subscribers. One very important strategic network development came in 1998 when Tajik Telecom connected to the Internet via X.25 Global One. This paved the way for international e-banking and credit card transactions with the National Bank of Tajikistan and the Agroinvestbank. Given the large number of Tajik migrant workers outside the country, especially in Russia, many of them professionals earning much higher wages and salaries than they could in Tajikistan, the possibility of electronic transfer of funds is an important source of overseas currency for the country.

Policy, Laws and Regulations

Strategic Policy

An ICT Consultative Committee under the President of the Republic of Tajikistan is due to be established soon which will be representative of the private sector and NGOs as well as the public sector.¹²³ The ICTCC will advise Government on the need for laws,

¹²¹ Various sources including UN Economic Commission for Europe (2003) *Towards a Knowledge-Based Economy: Tajikistan – Country Readiness Assessment Report*, and UNDP (2002) *Tajikistan: Human Development Report 2001-2002* in conjunction with the Open Society Institute, Tajikistan/SOROS Foundation.

¹²² UNDP (2002) p.21

¹²³ The ICTCC follows the holding of two national ICT conferences in 2001 and 2002 in Bishkek which helped define the issues and involved both public and private sectors and civil organizations such as TANTIS (Tajik Association for New Technologies and Information Systems) that unites various ISPs and news agencies, and called for a national development strategy for ICTs. These events draw attention to the active role of the private and civil sectors in Tajikistan.

policies and regulations pertaining to ICTs and on expenditure priorities in ICTs across different sectors of the economy and society, and will coordinate these efforts on a cross-agency basis. An executive body will also be set up to implement policy initiatives. This could be an important step towards mainstreaming ICTs within the Government's policy agenda, and in shifting focus from declarations of policy principles to the implementation of ICT infrastructure development, adoption and use.¹²⁴ Complementing this development, the Ministry of Communications has already started appointing staff to a new telecommunications regulator in line with commitments Tajikistan made towards becoming a member of the WTO. (See below).

Given the general lack of resources available to the Government, and the competing claims on those resources, it will be important that the ICTCC help establish a good investment climate to attract private sources of capital into ICT development. Such an environment should seek to recognize those sectors that are already showing signs of growth, such as mobile and Internet services and radio and TV information and entertainment services, and should also consider ways to identify other related and ancillary areas that could be encouraged, such as local language content, local assembly and customization of ICTs such as PCs and mobile handsets, and multimedia applications in partnership with overseas companies, etc.

The Information Analytical Department of the Presidential Office is currently the main agency within Government acting to oversee ICT development policies, having advised on the drafting of 15 'normative' laws on concerning communications, information protection, e-commerce, etc.¹²⁵ According to the Office, policy on 'informatization' is firmly set on further liberalization, yet there remains a general uncertainty or lack of awareness, certainly within industry, of the steps being taken or the timetable of events. One of the virtues of e-Government is to increase the efficiency of communications and therefore awareness of Government policies, although 'old' media such as radio, TV and newspapers are always available to disseminate this information if it is released in a cogent and timely fashion.¹²⁶

Strategic Framework: Telecommunications

In 2002 a new Law on Telecommunications was agreed following technical support from the EBRD. Under the new law the liberalization of the sector will begin in 2006, including the privatization of Tajik Telecom, the ending of Telecom's PSTN monopoly, and the establishment of an independent regulator. Steps towards industry regulation began in June 2005 when the Ministry of Communications established an Agency for the Regulation of Telecommunications, including the licensing of radio spectrum previously issued by the State Inspection Committee which will now focus upon equipment

¹²⁴ According to UNDP (2002) the Government's Poverty Reduction Strategy Paper, though it 'makes some use of the potential of ICT for improved education and healthcare, and emphasizes the need to expand the country's infrastructure, it does not take into account how ICT may be applied comprehensively for human development.' (p.12) Tajikistan was listed 112th of 174 countries in the 2002 Global Human Development Report.

¹²⁵ See UNECE pages 26-29 for a list of these laws.

¹²⁶ The Government's Poverty Reduction Strategy Paper (PRSP) 'directly calls for more televised debates and question sessions among senior government officials.' UNDP, 2002, p.53.

standards and type approvals. It is not clear whether the licence fees of 1-2 per cent of turnover which previously went to the state budget will now go to the new regulatory body.

In December 2002 the Ministry of Communications approved a 'Programme for the rehabilitation and further development of telephone services and wire broadcasting in rural areas in the Republic of Tajikistan for 2003-2005' which includes projects for regional wireless loops and satellite communications, although the latter are expensive. The longer term plan is to adopt wireless technologies such as WiMax, but mountainous conditions are problematic. The focus of the 2003-2005 plan is the Telecom Trunk Network Strategy which combines a national road building programme and the construction of a national telecoms trunk network using DWDM technology at the cost of USD16 million.¹²⁷

There is no published general review of telecommunications by the government in Tajikistan other than annual returns by the Ministry of Communications to the ITU which are just summary overviews, and even the establishment of a separate regulatory body in June 2005 remains an unknown to many in the industry. It is to be hoped that this development will open the way for an innovative approach to network investment. For example, a key component of the Government's efforts to link schools and higher educational institutions nationwide is TARENA (Tajikistan Research and Education Network Association) which represents Tajikistan's participation in the 2002 Virtual Silk Road programme funded by NATO's Scientific Research section covering nine countries in Central Asia and the Caucasus region. The Virtual Silk Road will connect major research and university establishments in Dushanbe and then 55 schools across the country using microwave to be replaced by ADSL, but NATO funding ends in 2007 and other sources have to be found. TARENA has been seeking a licence from the Ministry of Communications to offer commercial services, a move opposed by some private sector ISPs.¹²⁸ It is precisely to ensure that all resources are fully utilized in a market efficient way and with fair competition that an effective independent regulator is so necessary. For example, TARENA's network could provide nationwide carrier services for mobile operators and ISPs, and could offer international connections cheaper than satellite.¹²⁹

Strategic Framework: TV and Radio

There is one state-run TV station and soon to be two such channels helped by donor funds from Japan, in addition to a local government TV network in Dushanbe. The Government has also licensed 16 smaller privately-run regional TV stations. There are two state-owned radio channels, and again the Government has licensed others, four in Dushanbe and two in the North. The newly-created regulatory agency will take over responsibility for media licensing as well as telecommunications. The major problem that

¹²⁷ DWDM (Dense Wave Digital Multiplexing) uses different spectrum frequencies along fibres to mix and send traffic of different bandwidths at high speeds.

¹²⁸ At the same time ISPs have been offering free hours of connectivity to schools linked to the TARENA network.

¹²⁹ An alternative view from the Ministry suggests that Government will continue to be the major source of funding for TARENA. The real question is, will TARENA be able to fully explore the commercial options.

the industry currently faces is a lack of transparency in the allocation of frequencies and licensing.

Strategic Framework: Information Technology

The use of computers in Government came in 1996 at the Executive Administration of the President of the Republic of Tajikistan. They have been used in the drafting of over 1,200 legal documents every year, but because other departments do not have computers these documents still have to be reproduced in hardcopy. The next major step is the Government's State Computerization Programme 2003-2007, but the role of e-Government is in its very early stages. Plans for the future placement of government agencies online are being submitted by the Ministry of Communications to the Government in August 2005, while a 2005 version of the e-Readiness report is being prepared. The Government's plans to computerize its own offices is being assisted with a World Bank grant of USD800 million. One of the first areas chosen is the Ministry of Taxation and the Department of Revenue Collection. Phase One, an overall assessment of needs has been completed with technical assistance from USAID (US Agency for International Development) and the Government is hoping for ADB funding with counterpart funding from the central Government budget to assist in Phase Two, the implementation stage. Revenue-collection software to allow tax payers to file their tax returns on line is being developed locally with the help of the consultancy group, Bearing Point. The ultimate aim is to link revenue offices nationwide, simplify taxation assessment procedures and increase the transparency of revenue collection.

The area in which most emphasis has been placed in recent years seems to be the education sector. According to the Ministry of Education, over 40 per cent of schools now have computers, although most are not connected to the Internet. Several donor organizations and NGOs are active in schools projects under the Computerization Programme. For example, the CIPI (Civil Initiative for Policy on Internet) is an NGO¹³⁰ involved in placing computers in schools and public institutions such as museums, libraries as well as offering training on how to use PCs and how to use the Internet. Likewise, Relief International, an American NGO, is working with ISPs to bring Internet access to the schools where it has donated PCs - see below. In 1999 the Science and Education Development Association was formed to encourage the introduction of ICTs in secondary and higher education, and with the help of Telecomm Technologies, the first ISP in Tajikistan, arranged for free Internet access to eight institutes of higher education and the Ministry of Education.

Health is the other important social service for which plans exist to bring PCs and to network them, but currently only the Ministry itself has Internet access and a Website funded by the USAID 'ZDRAV PLUS' project. The Ministry has won Government approval for installing computer systems into hospitals to assist family medicine and to reform the financial system of health care but waits funding from the World Bank and

¹³⁰ CIPI began in 2001 as a Global Internet policy joint initiative of two American NGOs, Internews Network and the Centre for Democracy and Technology as part of a wider initiative for developing CIS countries.

possibly other donors before it can proceed. There are no computers used in primary health care delivery in Tajikistan.

Strategic Framework: Investment Policies

All companies in Tajikistan are required to pay 20 per cent value-add tax, together with an additional 2 per cent levied to finance the road building programme and 4 per cent on payments to overseas suppliers of services to a company, plus a 30 per cent profits tax. In addition ISPs and other telecom companies are charged 1-2 per cent on turnover as licence fees to the State Inspection Committee. Customs duties on imported ICT equipment are between 20-30 per cent of value in cases where certificates of origin are available and higher where they are lacking. Imports paid for by donors come in duty free.

As elsewhere in Central Asia, for several years there have been arguments for tax incentives for the ICT sector, and industry representatives reported that the Ministries of Communications, Education and Trade and Industry were quite favourable to the idea, but the Ministry of Finance not so. The problem is always to convince the Finance Ministry that tax incentives can boost revenues through encouraging investment. For low income developing countries it is not always easy to make this argument seem sound even if it can be pointed out that it has worked in other environments. At minimum, the regulatory framework has to be favourable as well as the tax regime. The idea of a technology park has also been mooted, but again landlocked countries in particular must be realistic about what they can offer ICT investors in terms of costs, productivity and markets.¹³¹ The sensible step forward is to focus upon what can be built around existing ICT sectors, such as ancillary industries. In the case of Tajikistan this could involve reconditioning PCs and telephone and mobile handsets, the assembly of solar-powered PCs and handsets for overseas manufacturers, the development of localized software for PCs and for mobile phone networks, and of content for mobile phones and Internet sites. A taskforce approach to investigate these possibilities is one possibility, perhaps drawing upon the existing expertise of the private sector and the university research community. It would certainly make for a more concrete proposal for tax incentives if a selection of ICT projects could be identified beforehand that would attract the support of private sector capital.

The other key part of investment is human capital, or people trained and skilled in the use of ICTs. In the Soviet period academic teaching was primarily focused on programming skills, but these have little relevance to today's requirements. The training needs in Tajikistan today are more focused on the use and the applications of ICTs. The universities, under the direction of the Ministry of Education, are slowly adapting to this demand, but lack of qualified staff and equipment and connectivity remain major constraints. Several NGOs with donor support are active in trying to put PCs in schools and to train the teachers as well as the pupils. None of the multinational ICT companies has a presence in Tajikistan to provide training, but staff who qualified overseas train in the Cisco Academy at the Tajik Technological University with additional support from

¹³¹ According to the UNECE (2003) report, none of the trademarks and patents registered in Tajikistan's National Centre for Patents and Information (NCPI) relate to ICTs.

the Aga-Khan Foundation for computer laboratories and business and human capital resource centres.¹³² Other universities with ICT courses include the Technological University of Tajikistan, the Tajik State National University and the Russian-Tajik Slavonic University. In preparation for the adoption of e-Government, an Institute for Civil Service training has been recently created that requires civil servants to become proficient in ICTs.

Technology

Technology: Telecommunications

Most of the telecommunications network was destroyed during the civil war in the early 1990s, but recovery with overseas donor assistance has been substantial. Old analogue switching equipment is being steadily replaced with digital switches using a variety of grants, in the 1990s from Germany, Turkey and the Republic of Korea, and more recently from China and especially from the EBRD. Digitalization of switches rose from less than 8 per cent in 2002 to around 70 per cent in 2005. However the quality of the analogue transmission system remains very poor. An automatic billing system was introduced by the state-owned monopoly Tajik Telecom in 2000 with a grant from the ADB, and with the help of USD13 million from the EBRD, and additional support from Switzerland and Japan, and the involvement of China and Germany, more digital switches were introduced and a SDH ring around Dushanbe, and nationwide 14 DAMA satellite system terminals from Gilat (Israel). The second phase of the EBRD project included digitization of microwave links between Tajikistan's main cities and towns as well as the Tajik section of the Trans-Asia-Europe optical fibre backbone (Dunshanbe-Hissar-Shakhrinav-Tursun-Zade). Most rural lines remain copper wires strung between telegraphy poles.

Mobile cellular technologies include both GSM and CDMA, including '3G' UMTS and CDMA2000 (two of each) which illustrates the technology leapfrog available to developing countries that have no legacy networks. But it should be pointed out despite worldwide publicity on 3G services the real advantage of third generation networks is they are more efficient users of radio spectrum from an operator's and regulator's perspective.¹³³ A few of the mobile-cum-ISP operators have even started building their own fibre and broadband radio local access networks, including FTTB in parts of Dunshanbe, a trend that may prove highly significant for the future development of effective telecommunications competition.

Technology: Radio and Television

Cable TV exists in some areas of Dunshanbe at affordable cost, providing mostly Russia and foreign channels and in 2002 TV-Service began offering 12 channels of news, sports and entertainment over radio links but at a connection fee of USD70. By 2003 it had just over 500 subscribers. Since the completion of a national fibre optical cable backbone network that links relay stations, multi-channel TV and radio broadcasts can now reach most parts of the country.

¹³² UNECE (2003) and UNDP (2002) both contain details of the courses and resources available.

¹³³ But while voice and SMS remain the most used services, there is a steadily rising trend towards using Internet downloads such as ringing tones, and phone-cameras.

Technology: Hardware

Branded imports of PCs are expensive and restricted to Government, international organizations, large private companies such as banks and to donor-sponsored NGOs. Otherwise most PCs are assembled from parts by local shops. Many TV sets are similarly assembled locally from parts that have been brought in from Russia. Second hand mobile phones are available, but the UMTS and CDMA 2000 network operators also retail the latest models of 3G phones.

Technology: Software

Most imported software is not licensed, much of it is in Russian, but mostly with no certificate of origin. Few people have technical training in modern software, although the Tajik Technological University provides courses with several thousand graduates since 1999, including a Cisco Academy with overseas Cisco trainees, and there has been discussion with Microsoft's Moscow office concerning a training centre in Tajikistan, but these talks began in April 2000 according to the 2002 UNDP's Human Development Report. Many Tajiks with such skills are attracted to working in Russia which is a brain drain, although money remittances and telephone calls home add to Tajikistan's economy, and in the longer run these economic migrants may provide vital links for foreign investors interested in the Tajikistan market. The Technology University also organizes distance learning courses in Moscow for around 100 students a year.¹³⁴

Markets

Markets: Telecommunications

Tajik Telecom is a state monopoly for PSTN services, but according to the commitments Tajikistan has made towards WTO membership this monopoly will be ended during 2006.¹³⁵ Network growth has been quite slow due to the understandable emphasis being placed upon upgrading and digitalization rather than expansion.¹³⁶ Subscribers number just over 260,000, up from around 240,000 in 2003. Nationwide average teledensity is only 3.6, but more than one-third of the lines are in Dushanbe where officially only 9 per cent of the population live, but unofficially the population may be twice this number. Eighty-five per cent of lines are in urban areas where the average teledensity is nearly 12 per 100, but in rural areas where over 70 per cent of people live the average rural teledensity is less than one per 100. In 2003 installation fees were USD3.67 and monthly rentals USD0.37 with local calls free of charge. Business lines are about six times more expensive.¹³⁷ Lines connected to new digital exchanges have a metered tariff of USD0.003, although it is not evident that metering calls is either cost-efficient or

¹³⁴ See UNDP (2002) chapter 3, for details of other initiatives by NGOs to provide schools with hardware and software.

¹³⁵ In 1996, five per cent of the shares in Tajik Telecom were transferred to employees as the first phase of privatization.

¹³⁶ Investment in digital switches and major transmission links makes network scalability more efficient and cost effective. Networks with various vintages of technology are prone to faults and high in demand for human resources in outdated skills.

¹³⁷ Giving USD figures is somewhat misleading for consumers because exchange rate fluctuations do not directly impact upon local prices. For example, in 2002 monthly rentals were approximately USD0.25. But Tajik Telecom, or its donors, do have to pay US dollars for imported equipment and revenues in somani eventually have to pay for these.

economically efficient.¹³⁸ What it will do is to generate income from dial-up Internet calls, for example as used by many medium-sized businesses. Internet cafes tend to use leased circuits. International calls are expensive, around USD3-4 per minute. In some areas citizens place telephones in public places to substitute for the lack of a public phone, charging around USD0.05 a call. This suggests that if more telephones were available, demand would be forthcoming even at higher than official prices.

The real phenomenon in Tajikistan is the issuing of at least 12 mobile cellular licences. This would appear non-sustainable except for the fact that many of them operate only in selected regions in which they are either the only operator, or one of two. The first operator (TajikTel) in 1996 was awarded an exclusive licence for 5 years in Dunshanbe, charging high fees with out-dated equipment. In 1998 another company (Somoncom) with the backing of the American MCT corporation was similarly given a licence to operate in Khujand and Sougd in Northern Tajikistan but again high prices dampened demand. From 2001 onwards a number of new licences were issued. The companies included TT-Mobile owned by MLT (Mobile Lines Tajikistan) as a joint venture between MegaFon of Russia and Tajik Telecom, Babilon-M a US-Tajik joint venture, and Indigo a joint venture of the MCT corporation and the Aga Khan Fund for Economic Development. Competition brought modern technology (four 3G licences have been recently issued) and lower prices, at least in Dunshanbe and market demand responded accordingly. In five years subscribers have risen from 1,000 in 2000 to over 200,000 and the rate of growth continues. Very soon mobile phones will overtake fixed line phones. This experience is an important lesson in the benefits of competition in revealing hidden or latent demand despite prices that are relatively high compared with average incomes.

An important issue is the right of the cellular mobile companies to be able to build their own backbone networks. For example, Babylon-M has an optical fibre backbone ring for its traffic in Dunshanbe. Babylon is also one of the leading Internet service providers, branded Babylon-T. There are upwards of twenty licensed ISPs, mostly commercial and not all operating. The first started in 1994, but some only provide email rather than dial-up access to the Internet. One of the first, but offering email only, was the humanitarian organization CADA (Central Asian Development Agency) that still provides service through email centres across the country. There are five Tier One ISPs with their own networks constructed through leasing circuits from Tajik Telecom's Republican Data Transmission Network (RDTN) and through rather expensive privately negotiated satellite phone connections that by-pass the PSTN, particularly outside Dunshanbe where PSTN connections are few and are of poor quality. Within Dunshanbe, 'radio' ADSL is available, but the customers are international organizations, Government agencies, NGOs with donor financing and private companies such as banks and textile manufacturers. A Russian company, Mobitelecom operates a 2Mbps data link between Dunshanbe (and Bishkek) in partnership with Telecom. Members of the ISP Association¹³⁹ arrange peering between their networks within Dunshanbe through a local server. Tier Two ISPs,

¹³⁸ Metering, billing and reconciliation add to administration costs, while the usage rates of individual subscribers are not directly related to either incremental investment costs nor to operational costs because in modern networks the marginal cost of transmission is close to zero.

¹³⁹ Six of the ISPs belong to the ISP Association.

of which there seem to be around 10, lease capacity from Tier One ISPs, and provide Internet access and email, often through Internet cafes.¹⁴⁰ Internet cafes got an initial boost from support from the Soros Foundation's Open Society Institute and the UNDP for NGOs. Internet access prices remain relatively high, around USD1.5 – 2.5 per hour (average monthly salaries are around USD10 but can be much lower) affordable to maybe 0.3 per cent of the population, but that means 180,000. Industry estimates of Internet users vary from around 15-20,000 to as many as 60,000 or more based either upon registered users or upon actual users in universities and schools, government offices and private companies, international organizations and NGOs, Internet cafes and public access points, etc.¹⁴¹ So even these figures suggest the market can grow at least another three-to-six fold if the network and the service are available. The monthly tariff for unlimited access over a dedicated circuit for organizations ranges from USD30 (night time only) to USD133 (24 hours) but can rise to USD400 for asynchronous and USD800 for synchronous circuits depending upon speed. These tariffs are not affordable for SMEs.

From 2006, in theory at least, mobile cellular operators and ISPs will be able to apply for licences to build their own network facilities and offer telecom and fast Internet services, for example using broadband wireless access (BWA) technologies. Currently the best ISPs can offer is VoIP 'calling cards' or Internet telephony for international long distance offering prices five times lower than Tajik Telecom,¹⁴² and even here there seems to be uncertainty over future licensing policy as at least one ISP complained their VoIP licence had not been renewed. The major regulatory obstacle to the full development of competition in the international long distance market, which is of significant size given the number of migrant Tajiks overseas, is that incoming calls have to be terminated through Tajik Telecom. There is therefore a danger that the Government may be tempted to forestall effective competition to smooth the way for the privatization of Tajik Telecom, which would be a policy error sending the wrong signals to the market and to new entry investors. With alternative facilities developers there would be a fall in monthly rentals of lease circuits in the wholesale market that according to the 2003 UNECE report current vary between USD145 for 9.6Kbps to USD887 (!) for 64Kbps. Following this logic, there is a real prospect that some of the mobile and Internet service providers will transform into competitive full service providers in the years to come.

For people who cannot afford mobile phones, there are two pager companies offering service at monthly rentals from USD7-12 per month. Pagers cost around USD40-50. Although the quality of ISP networks is rather poor and low speed the sector is active although profit margins for ISPs remain too low to attract local entrepreneurs on a large scale. For this reason the UNDP is beginning to focus its attention on the development of

¹⁴⁰ 'Email services are available in universities and some international and local NGOs, sponsored by UNDP, CADA, OSI, the Eurasia Foundation and IREX, which has four centres in Dushanbe, Khujand, and Kurgan-Tyube with more than 300 users.' UNDP, 2002, p.40.

¹⁴¹ The higher estimate is based upon estimations of the Association of Civil Initiative Policy on Internet Provisioning

¹⁴² A call to Moscow 'is 0.08 cents, which is 5.4 times lower than the cost of a one-minute call via traditional telephony, which accounts for 0.43 cents.' UN Economic Commission for Europe (2003) *Towards a Knowledge-Based Economy: Tajikistan – Country Readiness Assessment Report*, p.9.

a ‘tele-cottage’ model for rural areas and villages. Quite recently, through ICANN Tajikistan managed to gain full national control over its Internet top-level domain name, TJ. Previously it was ‘owned’ by an American company and used for pornographic and other undesirable materials.

Markets: TV and radio

There is one, and soon to be two, state-owned national TV channels and in Dushanbe a cable and a satellite TV service providing mostly Russia and foreign channels. In 2002 a private TV-Service began offering 12 channels of news, sports and entertainment over radio links but at a connection fee of USD70. By 2003 it had just over 500 subscribers. There are also 16 regional TV stations, mostly in the North of the country that rebroadcast Russian programmes in addition to several hours of their own news, sports and entertainment. Advertising income remains very low, and often the TV station will carry paid anniversary greetings or locally sponsored programming which plays to local interests but also to local hierarchies that threatens the true independence of the stations.¹⁴³ In this respect the cost of running private radio stations is less and advertising revenues correspondingly more adequate, but several private stations only got off the ground with support from donors, for example the Soros Foundation, the Mercy Corporation of America and in one case with UNESCO funding for equipment. Private radio stations frequently also offer their own news agency services, initially through subscription to international organizations and NGOs, and more recently with advertising.¹⁴⁴ In the case of Asia Plus, an entrepreneurial start-up news agency that was assisted in the 1990s by the CADA (Central Asia Development Agency) and became the first private radio station in Dunshanbe, an application to add a TV licence has so far been unsuccessful, and yet it would seem that exactly this kind of enterprise should be encouraged.¹⁴⁵ It may be that the authorities are genuinely concerned about the commercial viability of too many TV stations, but that is when policy transparency is needed. To encourage investment there may be a case for reducing risk by limiting entry, but the danger is that policy instead becomes the protection of the *status quo* over innovation. ‘Must-carry’ rules can be used to ensure content the Government considers important is always available, and in any case new technologies such as digital radio available over the Internet are beginning to render restrictions as no longer meaningful. It is to be hoped that the new regulator will approach these issues in terms of what can stimulate the market and therefore investment and ancillary sectors such as content production.

In another development the Ministry of Communications is undertaking a project to link by optical fibre cable to Afghanistan and Iran, part of the Trans-Asia-Europe project, that will also carry TV and radio broadcasts.

¹⁴³ ‘Another source of income is provided by “latent advertising”, whereby TV stations produce and broadcast 10 to 15 minute films which positively present an enterprise, collective farm or politician.’ UNDP, 2002, p.37.

¹⁴⁴ According to UNECE in 2003 there were about 35 TV and radio broadcasting stations throughout Tajikistan. Exact numbers are unknown even within the industry such is the lack of transparency.

¹⁴⁵ The granting of the radio licence to Asia Plus was timed to coincide with the country’s independence anniversary in 2002. This could be interpreted as a nice gesture, but commercial licensing should be market driven, not driven by ceremony or politics.

Markets: Hardware

Both hardware and software are mostly imported, with numerous resellers of many types of telecommunications and multimedia equipment, from mobile and satellite phones to PABXs and trunked radio equipment. Attempts to sustain the local assembly of PCs have proved difficult, with only one of the two companies surviving since the Soviet period and that company focuses more on TVs. But cheap components do find their way across Tajikistan's borders and these are assembled into PCs in local shops for around USD450, but their parts are certainly not guaranteed to last. One industry expert suggested that the price of PCs could be expected to rise in the near future, when e-Government projects begin in earnest in Dunshanbe, and the regional capitals of Khudzhand in the North and Kurgan-Tyube in the South, the demand from Government for PCs will rise and when foreign banks are permitted to operate in the country after 2006 (according to WTO commitments) they too will create a demand for which there is no local supply.

Markets: Software

On the software side most imports are not licensed and are of variable quality. There are several efforts ongoing to translate software into the Tajik language. Under TARENA's Virtual Silk Road project the Academy of Science and the Technological University have special working groups on translation of software packages into Tajik. The international NGO Relief International is supporting a Schools-on-Line project that is placing 6-8 PCs in schools across the country (in the north, in the south, in the cluster of towns around Dunshanbe and in the remote mountainous Gorno-Badakhshan region bordering Afghanistan) and connecting them to the Internet with assistance from ISPs using Vsat and is simultaneously trying to develop local content and Websites. Schools-on-Line is also working with volunteers to translate software into Tajik. Another NGO, Youth Opportunities, working with World Bank funding, has been collaborating with volunteers to develop a Linux-based Tajik language software for free distribution to schools and other users, especially SMEs.¹⁴⁶ To become sustainable, Youth Opportunities is looking to translate financial accounting software into Tajik for commercial application, and is currently seeking donor assistance for this project. The Government is also currently considering an offer by Microsoft to donate dollars to translate Windows into the Tajik language.

¹⁴⁶ See <http://www.tajikngo.org> . Only one school in Dunshanbe is currently using the Linux software. Since almost all local Windows-based software is pirated copy, there is no financial incentive to use Linux. Most Government-used software is funded by the World Bank and the Asian Development Bank.

Uzbekistan¹⁴⁷

ICT infrastructure still does not reach many of Uzbekistan's 27 million people, 60 per cent of whom live in rural areas, and where it does, a *per capita* income of around USD300 does not permit most people or families to own a telephone, so when fixed line telephones increased from 1.6 million to 1.7 million between 1995 and 2001, the waiting list shrunk from 307,000 to 33,000. Usually when supply increases from very low levels, so does demand. The fact that it did not in Uzbekistan may indicate two factors: first, the very low levels of income of those without telephones, and second, the high concentration of telephone accessibility in the capital city, Tashkent, and non-availability in most other places. But since 2002 the situation has been gradually improving, due in large measure to the decision by Government to prioritize ICTs as both fixed and mobile cellular phones become available to a wider public, and Internet access is spreading in parallel. However, a highly skewed distribution of income that pushes almost 30 per cent of the population below the poverty line (Gini coefficient estimated at 44.7 in 1998¹⁴⁸) is likely to limit the spread of ownership and to a lesser extent usage to the better-off in urban areas for a long time to come.

The economy of Uzbekistan is highly dependent upon agriculture and agricultural product processing, which contributes around 40 per cent of GDP, with cotton accounting for 45 per cent of exports. Industry accounts for just over 25 per cent of GDP, mostly extractive industries such as gold and natural gas which account for most of the other exports. In these sectors the most likely use of ICTs is computers and software on the administration side. The services sector accounts for 35 per cent of GDP, including Government services where the use of ICTs is most heavily concentrated. The UNDP estimates companies in the ICT sector accounted for 2.5 per cent of registered companies and the total volume of services and products accounted for 2.6 per cent of GDP.¹⁴⁹ An important initiative here is in the public services sector where a schools ICT programme is underway.

Policy, Law and Regulation

Strategic Policy

The defining policy document of Uzbekistan's approach to ICT development and usage was issued by Presidential decree on 31 May 2002, 'On the Further Development of Computerization and Introduction of Information and Communication Technologies.' This led in September 2002 to the creation of the Communication and Information Agency of Uzbekistan (CIAUz) to oversee all ICT policy development, laws and regulations. All other ministries with ICT activities are represented on the CIAUz, and a very important aspect of the CIAUz is that it is chaired by the Deputy Prime Minister, giving it high authority within and across Government. The CIAUz was tasked with developing 2003-2010 programmes for telecommunications, e-government and e-

¹⁴⁷ References include UNDP (2005) *Digital Development Initiative Programme: Review of ICT Development in Uzbekistan in 2004*, jointly with the Communications and Information Agency of Uzbekistan; UNECE (2003) *Towards a Knowledge-Based Economy: Uzbekistan*

¹⁴⁸ CIA Factbook

¹⁴⁹ UNDP (2005) *Digital Development Initiative Programme: Review of ICT Development in Uzbekistan in 2004*, jointly with the Communications and Information Agency of Uzbekistan, p.26

commerce.¹⁵⁰ The extra-budgetary Fund of State Support for Development of Post and Telecom was renamed the Fund for Development of ICTs, and the Uzbek Agency for Post and Telecommunication (Ministry of Communications until 1997) was transformed into the Uzbek Agency for Communication and Informatization (UzACI) and made into the executive body of the CIAUz, while the Uzbek Computerization and Information Technologies Development Center (UzInfoCom) was created as the implementing agency. The setting up of these government policy agencies is an important first step towards implementing plans for ICT development. The important next step is the implementation process, but this is slow partly due to a lack of funds but also the result of the lengthy and bureaucratic legal processes involved in revising and updating all the related laws, decrees and regulations that are required to put policy into effect. A reform of this process would greatly help accelerate the development and implementation of ICT policies. The slow pace of implementation was noted by the CIAUz at its March 2005 meeting.¹⁵¹

Strategic Framework: Telecommunications

Government strategic policy is to privatize the incumbent operator Uzbek Telecom and to open the market to competition in accordance with the country's aim to join the WTO. Under the direction of the State Property Committee (GKI) and the Privatization Bureau, Uzbek Telecom was formed into a joint stock holding company and prepared for privatization by 2002.¹⁵² But progress has been slow and the Government has reduced the stake they were prepared to sell in 2004 from over 60 per cent to 49 per cent which lessens the attractiveness to foreign bidders.¹⁵³ Uzbek Telecom was also confirmed as the monopoly for international traffic, including IP Telephony, a move designed to prop up revenues ahead of privatization but not one designed to stimulate competition or market growth. The Law on Telecommunications (1999) introduced a systematic licensing regime consisting of two types of licence, General and Individual, that specify additional special requirements, and four licensing categories covering network construction, operations, and telecommunication and data services. Licensing and other regulations come under UzACI, but the regulator's website does not provide statistics and information beyond simply posting up application forms for licences. Radio frequencies are allocated and assigned separately by the State Commission for Radio Frequency Spectrum with many ministries represented on the commission. Fifty per cent of the spectrum licence fees go into the Fund for Development of ICTs and fifty per cent go into the further development of spectrum resources. Despite this the separation of radio

¹⁵⁰ The CIAUz was also tasked 'together with large foreign and domestic computing and information companies, to establish a Centre for development and implementation of computing and information technologies.' Decree of the President of the Republic of Uzbekistan, No.2002/3080.

¹⁵¹ 'The council criticized some of the state bodies for slow introduction of ICT and told them to take measures to implement the governmental decisions on development of computerization and ICT introduction.' CIAUz (26 March 2005) <http://www.teleradio.uz/news.php?Lang=en>

¹⁵² ADB (2002) Technical Assistance to the Republic of Uzbekistan for Developing a Management Information System for Uzbek Telecom
http://www.adb.org/Documents/TARs/UZB/TAR_UZB_36670.pdf

¹⁵³ The Government has stated it plans to hold on to 45 per cent of shares, and 6 per cent will go to Uzbek citizens and institutions. In 2005 by resolution of the President, a Program of Denationalization and Privatization of Enterprises for 2005-2006 was announced, but Uzbek Telecom does not appear on the list.

frequency allocations and assignments from telecoms regulation may hinder the transparent and efficient management of spectrum and denies the regulator an independent source of income and should be reviewed.

Strategic Framework: TV and Radio

Uzbek Telecom provides the national transmission facilities. Previously, ‘many of the Soviet system’s technical operations, such as frequency control and international connections, were centred on Moscow, meaning that Uzbekistani broadcast personnel have had to absorb all those functions without the expertise to manage all the technical aspects of an independent national broadcast system. Long term plans call for decreased involvement by the ministry and decentralization, with the operation gradually turned over to private enterprises.’¹⁵⁴ Most recently, East Telecom, a British-Uzbek-Russia joint venture, has announced plans to invest about USD5 million in an IPTV project in Uzbekistan in 2005-2006.¹⁵⁵

Strategic Framework: IT

By giving priority to the development of ICTs, Uzbekistan has been able to raise the percentage of Internet users threefold since 2002, from less than one to nearly three per 100 population. Assisting the process has been the UNDP’s awareness raising Digital Development Initiative (DDI) that has helped frame legislation in four areas: e-laws, e-commerce, e-signatures and informatization, including freedom of information and IPRs. The DDI has sponsored ICT workshops and training programmes run by NGOs and with additional assistance from the UN Volunteers programme.¹⁵⁶ In the 1990s the UNDP assisted in the setting up of a pilot e-government project, an inter-ministerial network, UzSciNet, and with the help of the Open Society Institute/Soros Foundation a national academic and educational network has been created connecting over 100 research and educational institutions, libraries and civil society groups who can gain Internet access. The UNDP also cooperated with Cisco to help establish a Cisco Networking Academy in Tashkent, training students in networking technology. In 2005, the UNDP replaced the DDI with a project for ‘Assisting the Government of Uzbekistan in the formulation and implementation of ICT for development policy.’ This includes ‘implemented in cooperation with the Communications and Information Agency of Uzbekistan, a series of TV-programmes on ICT will be broadcasted on “Yoshlar” Channel of Uzbek national television.’ A series is now running called ‘Taraqqiyot sari’ (Towards Development) every third Wednesday during a year.¹⁵⁷ The UNDP’s current projects with the

¹⁵⁴ <http://reference.allrefer.com/country-guide-study/uzbekistan/uzbekistan52.html>

¹⁵⁵ http://www.bisnis.doc.gov/bisnis/bisdoc/0507UZ_News.htm July 12th 2004.

¹⁵⁶ ‘UN Volunteers (UNV) is recruiting talented young people from local universities with computer skills to help local organizations as part of the UN Information Technology Services (UNITeS) initiative. The volunteers provide training in basic computer skills, help create web sites and databases and repair broken computers.’ <http://www.undp.org/dpa/frontpagearchive/2003/january/14jan03/>

¹⁵⁷ ‘Each programme will consist of ICT related news, “Topic” section and “Quick Tips” section. ICT news section will include local and international news on information technologies. During the “Topic” section various issues and themes related to ICT will be discussed, interviews with distinguished people in the ICT related area will be conducted, reportages on the most recent development in the ICT will be shown. “Quick tips” section will give people more practical knowledge and skills on ICT that can be used in every day life.’ <http://www.undp.uz/content/view/97/2227/>

government include a National ICT Summit in September 2005, the implementation of an e-document flow system for government, sub-laws on e-commerce and e-signatures to support the normative laws previously passed, a monitoring task and preparation for Uzbekistan's participation in WSIS.¹⁵⁸

Despite high level recognition of the benefits to the country of ICT development, this gets translated into practice in incomplete ways. For example, the programme to place computers in schools, which comes to around USD2 million a year, excluded distance education and video-conferencing, partly because the state budget is limited and also because this ICT application was not originally recognized by the officials concerned. Donor assistance from the ADB, IREX, and from China, the Republic of Korea and the USA has helped partially fill the gap, yet according to UzInfoCom (see above) currently only 2,000 out of 10,000 schools have computer courses. The schools programme is a CIAUz priority.¹⁵⁹ While the Ministry of Education tries to place PCs in schools and place schools online, the separate Ministry of Higher Education is supporting the development of UzSciNet (see above) but funding expires in 2007 and the network will migrate to a payment basis, charging around 1/3 commercial rates to provide Web access and host Web content. The Ministry also arranges for around 50 students a year to study overseas, a small but important contribution to knowledge transfer.

But important steps are being taken to improve the levels of ICT proficiency. For example, the Tashkent University of IT (TUIT) which celebrates its 50th anniversary in September 2005 is leading a national ICT programme of teaching and research supported by 'branch' universities in other cities of the country. TUIT has 5,000 students who take four years undergraduate and two years masters courses covering telecoms, radio and TV content and technical issues, IT, communications management and military IT. New topics covered include security, e-commerce and software development. TUIT also has joint study programmes with universities in the Republic of Korea and Malaysia, and houses the Cisco Academy. TUIT also houses another important initiative, the Center for Women's Training in Telecommunications and IT (CWTTI). Although programmes are not exclusively for women, the major intake is planned for women working in government offices to raise their skills and technical knowledge. Professional women working in the industry will also be participants and the CWTTI hopes to help promote centres in other central Asian countries.

Strategic Framework: Investment

According to UzInfoCom, currently foreign investment is encouraged in all industries in the form of tax exemptions for seven years where the foreign component is over 51 per cent. Also, fifty per cent of all radio frequency licence fees go into the Fund for the Development of ICTs. In July 2005 the CIAUz had approved a telecommunications

¹⁵⁸ UNDP projects for the future include IT support (technical and training) for NGOs, educational establishments and government organizations, preparation of research, conceptual and analytical documents for ICT policy in Uzbekistan, and capacity building and training for Government officials.

¹⁵⁹ 'The council said the priority tasks for the nearest future were development of information resources in the national segment of the internet, expanding international cooperation in the ICT sector, forming the national school of programmers and personnel training.' CIAUz (26 March 2005)

<http://www.teleradio.uz/news.php?Lang=en>

investment programme for 2005-2011. According to the Interfax news agency 'The program involves increasing total switchboard capacity to 2.2 million numbers by 2010 from 1.98 million numbers in 2005. The capacity of digital switches will increase to 2.2 million numbers from 934,500 this year. Fiber optic and digital radio relay lines will increase from 7,668 km to 9,680 km. According to forecasts, the number of mobile subscribers in the country will increase from 850,000 to 3 million by 2010. The program also involves increasing the number of Internet users from 750,000 to 3.4 million. The program calls for a number of measures to apply information and communications technologies (ICT) in the activities of government agencies, and the creation of a national information search system. By 2010, the use of corporate computer networks in government administration is supposed to increase from 15% to 70%, and the proportion of electronic document flow inside agencies is to increase from 20% to 60%. The program is to be financed with loans and foreign investment, the internal resources of operators and providers, and government funding. Investment in the program is expected to total about USD50 million. The program also calls for measures to improve ICT regulations and legislation. In fall 2005 a proposal will be prepared and submitted to the government on offering benefits to software producers in Uzbekistan and also producers of computer components.'¹⁶⁰

The Government has exempted imports of new ICT hardware from import taxes and duties till 2006, and an extension to 2010 is under consideration. This will help the private sector, but as the main importer the Government is also the main beneficiary. While no duties are paid on software licence fees and IPRs customs duty is paid on 30 per cent of the value of the software package, while VAT is 20 per cent and customs collections and certification fees come to 1.5 per cent and 1 per cent respectively. The US Commercial Department estimates that up to 80 per cent of software used is pirated.¹⁶¹ At the local level, the government has announced tax exemptions on company donations to schools and other public amenities, including projects such as computers in schools. Telecom companies and ISPs will be included.

Investment is coming in to the country, although in very low amounts. The sector attracted just USD36 million in 2004, according to reports by Reuters. The EBRD has recently announced a loan to cellular operator Unitel 'in an effort to make services cheaper and more accessible to the population'.¹⁶² Uzbekistan and China have moved closer together over recent years and 2005 has seen several investment agreements, including an allocation of USD4.9 million by China's Eximbank to start TV and radio broadcasts by satellite of at least two additional TV and radio channels, and USD8 million for Huawei (China) to install digital exchange equipment. In a MOU in July 2005, the CIAUz and ZTE signed a MOU for possible joint production of telecommunications equipment in the country. But the opportunity to attract foreign

¹⁶⁰ http://www.bisnis.doc.gov/bisnis/bisdoc/0507UZ_News.htm

¹⁶¹ <http://strategis.ic.gc.ca/epic/internet/inimr-ri.nsf/en/gr109400e.html>

¹⁶² <http://www.cellular-news.com/coverage/uzbekistan.php> (10th June 2005). The decision is controversial for the EBRD in light of the events in Andijan in May 2005, but the investment in Unitel is in line with the EBRD's current strategy for Uzbekistan, which prohibits it from lending to the government, or private sector companies that have ties with government officials.

investment is partly hampered by the very slow pace at which policy can develop, for example a law to open free economic zones was passed in 1996, but none had been established by 2005.

Technology

Technology: Telecommunications

Most of Uzbek Telecom's national trunk system is digital and the investment plans are to increase national fibre optical and radio relay links from 7,660 km to 9,680 km. But less than 40 per cent of local exchange lines are digital, and for a country of over 26 million people there are fewer than 2 million lines in use. The telecommunications infrastructure remains very poor and desperately requires investment. In July 2005 Uzbek Telecom issued corporate bonds for 2 billion soms, or approximately USD2 million, to raise funds for investment in its mobile and Internet subsidiaries and to deploy CDMA 450 wireless access technology. In July 2005 the State Radio Frequency Commission agreed to the allocation of 2.4-2.48GHz spectrum for the use of Bluetooth and WiFi technology. No decision has been taken on the allocation of 3.4GHz for WiMax. Broadband over ADSL using proprietary 'hot boxes' at the customer's premises are only available in two districts of the capital, Tashkent. To raise the level of operational and financial efficiency of Uzbek Telecom, in 2002 the ADB granted around USD40 million technical assistance for a management information system to assist develop modern accounting methods and to allow for a shift towards cost-based tariff reforms.

One problem facing all Central Asian economies, including Uzbekistan, is the lack of modern standards testing equipment for type approvals and lack of international standards specifications and recommendations translated into local language. All the countries try to follow ITU recommendations and ESTI guidelines, but the only mutual recognition agreements are with Russia and not even CIS-wide.

Technology: TV and Radio

Uzbek Telecom provides the nationwide distribution channels. East Telecom, as mentioned above, has recently plans to invest about USD5 million in an IPTV project in Uzbekistan in 2005-2006.

Technology: Hardware

Uzbekistan has an active hardware market, with two hundred or more small and medium-sized computer assembly, sales and service companies, but many of them heavily depend upon large customers such as corporate clients such as banks, government agencies and ministries, international organizations and media agencies, etc. Buying a PCs is beyond the income level of most people. The UNDP estimates in 2004 there were 590,000 PCs are in use.¹⁶³ Most business use of PCs does not yet involve networking, except in Government and the larger corporations. On the other hand, the rapid growth of Internet cafes is creating a demand. Non-convertibility of the soum is an obstacle to foreign

¹⁶³ See <http://www.ddi.uz/page.php?pageid=42&language=eng> Annual Review of ICT Development in Uzbekistan. This compares with 350,000 in 2003. See <http://strategis.ic.gc.ca/epic/internet/inimr-ri.nsf/en/gr109400e.html>.

investment in the sector. Most of the imports come from Russia, China, the UAE, Germany and Singapore.

Technology: Software

Software is produced locally for financial and accounting applications such as payrolls. Fido-Biznes is the largest local company specializing on the banking and financial sector. But like other countries of the region, most software is imported from Russia as pirated copies.

Markets

Markets: Telecommunications

The privatization of Uzbek Telecom (Uzbek Telecom) has been delayed several times, although most recently press statements have suggested a bid from the China Mobile Communications Corporation. It remains unclear whether the Government will decide upon an international tendering process. Uzbek Telecom's network is growing slowly to around 2 million direct exchange lines, and while most of its national trunk system is digital less than 40 per cent of local exchange lines are digital. Uzbek Telecom controls around 98 per cent of the local market and 96 per cent of the international market, with a monopoly on the international gateway. Despite its monopoly position, Uzbek Telecom's net profits fell by fifty per cent during 2003-2004. A new entrant (in which Uzbek Telecom seems to have a 30 per cent investment) is East Telecom, a British-Uzbek-Russia joint venture that offers international and domestic long distance calling, Internet access and video and data links and has plans to invest about USD5 million in an IPTV project in Uzbekistan in 2005-2006.¹⁶⁴ A majority shareholding in Buzton, the country's only other fixed line operator, was bought in 2004 for USD3.2 million by Russia's Golden Telecom, but Uzbek Telecom owns the remaining shares in Buzton.

PSTN tariffs are established by the Uzbek Communication and Information Agency, a sector regulatory body, under the guidance of the Ministry of Finance. In urban areas local analogue phone call services are free and digital call charges are 2 Uzbek soms per minute (US0.002¢). Corporate customers for digital pay a flat fee for 180 'free' minutes and then US0.02¢ per minute. Business customers are thirty per cent but account for 70 per cent of the revenues. Tariff rebalancing has not yet happened but it is planned.

There are probably upwards of 850,000 mobile users, almost twice what it was by the end of 2003. Mobile Telesystems (MTS), Russia's largest operator is the principle shareholder of UzDunrobita, the market leader through an aggressive competitive pricing policy that claims 430,000 users.¹⁶⁵ Unitel (in 2004 acquired from Daewoo of the Republic of Korea by a consortium led by a Greek company Germanos on behalf of a Malaysian investor)

¹⁶⁴ East Telecom was established by Eastwell S.A. Ltd., of Britain with 51%, Russia's Elix-Cable with 19% and Uzbekistan's Uzbektelecom with 30%. The joint venture has charter capital of USD7.17 million. The operator holds licenses to develop, build and operate telecommunication lines and offer local and international communication services. http://www.bisnis.doc.gov/bisnis/bisdodoc/0507UZ_News.htm July 12th 2004.

¹⁶⁵ MTL paid USD121 million in 2004 for a 74 per cent stake in UzDunrobita. The company operates GSM 900, GSM1800 and DAMPS networks and has announced plans to invest USD50 million.

and Coscom,¹⁶⁶ the second and third largest GSM networks, probably have over 250,000 and 100,000 each. All companies offer pre-paid services, although Unitel with 90 per cent coverage of the country and claiming the highest quality network was the last to do so in 2004. Unitel's investment plans include USD30 million financing from the EBRD, which holds 7 per cent of the shares. Russian investor Alfa Telecom (which through Golden Telecom in Russia owns MTS) in 2004 acquired from Superior Communications of Malaysia the majority shares in Uzmacom, a small mobile company serving 5,000 users. Then, after buying the remaining shares in the company from Uzbek Telecom in July 2005, closed the company to focus on the nationwide operations of Buzton, a small GSM operator started by the Bakrie Group of Indonesia. Two smaller mobile operators, Perfectum Mobile and SkyTel, a joint venture between Uzbek Telecom and NCI Projects International, a subsidiary of Russia investor Naytov that owns Perfectum Mobile, offer CDMA services. From this account it is evident that the mobile market has attracted foreign investment over recent years.¹⁶⁷

Internet access was introduced quite early in the 1990s to many Central Asian countries, pioneered by international NGOs such as IREX and The Open Society Institute/Soros Foundation and funded by the Internet Access and Training Program (IATP) of the US State Department. The freenet model was used, offering low cost access to non-commercial NGOs, community groups and the like. According to the CIAUz, today the number of Internet users in the country is around 780,000 or just under 3 per cent of the population, up from 137,000 in 2001 and a nearly 40 per cent increase in the first six months of 2005. Nearly 70 per cent of private citizens who access the Internet do so from over 500 access points such as Internet cafes, and over 70 per cent of Internet users are in Tashkent. There are also an increasing number of websites. The best informed are those funded by the Development Gateway Foundation¹⁶⁸ following support from the UNDP such as the Uzbekistan Development Gateway (UzDG) run by the Government-supported Center for Economic Research. It is a professional website with valuable information covering a series of topics, from health and education to the economy and government. There are many other web sites offering a wide range of commercial, economic and social information.

Data networks include state-owned UzPAK, which comes under the supervision of the CIAUz and is the largest national data network in the country, state-owned information network UzSciNet, and private networks such as Naytov. From October 2002 the Government released ISPs from having to register with state-owned UzPAK and only to use UzPAK circuits. Although Uzbek Telecom is supposed to hold the monopoly over

¹⁶⁶ 'Capital investments increased 38.9% to 6.185 billion soms. The company made four corporate bond issues in 2002-2004 totaling 2.55 billion soms. So far the first issue of 1 billion soms has been redeemed. The Coscom joint venture was established in 1996 by MCT of the United States with 51%, Uzbekkosmos with 35% and Davr-Konversiya with 14%. MCT now owns 85.6% of the company and minority shareholders, including Coscom managers, own the other 14.4%. Coscom holds a license to offer GSM standard services throughout Uzbekistan.' http://www.bisnis.doc.gov/bisnis/bisdoc/0507UZ_News.htm

¹⁶⁷ See Wireless Telecom at: http://66.102.7.104/search?q=cache:SJ7EzcIEXEgJ:www.cbonds.info/cgi-bin/download.cgi%3Fpublication/articles/Mobile%2520Research_AC.pdf+Perfectum+Uzbekistan&hl=en&lr=lang_en&client=firefox-a

¹⁶⁸ See <http://www.gateway.uz>

the international gateway, it seems that many ISPs unofficially use asymmetric service, using the PSTN for thin upstream traffic (emails, Web-site requests, etc.) and satellite or leased circuits for thick downstream traffic, which improves quality and reduces the cost involved in metered traffic over the PSTN. This arbitraging of costs is a typically market-dynamic solution to providing efficient services, and is best encouraged if the main objective is to spread Internet access and usage to low income citizens. Major closed user group (CUG) corporate networks are run by the Central Bank connecting 920 branch banks, and the State Taxation Committee. The latter enables the online filing of tax returns.

Kolko et al. (2004)¹⁶⁹ found in a recent study of Internet usage in Uzbekistan that the median number of PCs in Internet cafes was just over 7, and demand for their usage outstripped supply despite the cost of dial-up usage averaging USD0.87 per minute.¹⁷⁰ The most frequent use of the PCs was for online information and for offline game playing.¹⁷¹

Markets: TV and Radio

It was reported but not confirmed that some local production of TV monitors takes place, but most sets are imported.

Markets: Hardware

The UNDP estimates around 590,00 PCs in use by 2004, up from 350,000 in 2003 and 200,000 in 2002 and valued at over USD10 million.¹⁷² Around 60 per cent seem to be used in the Government sector and the remaining 40 per cent in the private sector, mostly in the state-owned and private enterprise markets (e.g., banking and finance, airlines and other transport services, trading companies, hotels, etc) and in Internet cafes and computer clubs, but also increasingly in schools and colleges following a drive by Government to increase the use of computers in education and training. While the majority of PCs are in Tashkent, including in 2003 maybe 80,000 in the private sector, there is a steadily growing number being used in other cities such as Samarkand, Bukara, Andijan, Fergana and Navoi, again mostly in the Government offices and the state sector, but around 60,000 in the private sector. PCs are often locally assembled from imported components and therefore cheaper than imported branded computers which come mostly from the UAE and Russia. Currency controls have so far deterred foreign companies setting up manufacturing in the country. Most recently in July 2005 the CIAUz signed a MOU with the ZTE Corporation (China) that envisages the joint production of mobile and broadband telecommunications equipment in Uzbekistan, such as CDMA 450 and data systems.

Markets: Software

¹⁶⁹ B.Kolko, C.Wei and J.Spyridakis 'Internet Use in Uzbekistan: Developing a Methodology for Tracking Information Technology Implementation Success' *Information Technologies and Information Development*, v1.2 Winter 2003, pp.1-19; MIT 2004.

¹⁷⁰ Dial-up was 65 per cent of the access points researched, the rest were cable, ISDN and even some DSL.

¹⁷¹ The researchers also question the 2002 official figure of 275,000 users, suggesting it may be far less. They cite two of the largest ISPs claiming no more than 1,200 and 2,500 subscribers respectively.

¹⁷² See Digital Development Initiative <http://www.ddi.uz/page.php?pageid=42&language=eng>

The UNDP estimate the market for computer software in 2003 at between USD5-10 million, with at least half that being met by local software developers, the rest through imports. Rather typical for developing countries, pirated software is estimated by the US Commercial Office to account for up to 80 per cent of actual usage. Most software seems to be used for accounting, payroll, and administration and database services. IT companies reached 500, of which around 60 were software developers, mostly located in Tashkent. IT specialists were estimated at 8,500, including 1,400 who support or develop software, but the UNDP warns that over 5 per cent of qualified programmers leave the country every year and only 50 per cent of their places get filled. One interesting statistic is that 300-350 developers are involved in offshore programming.

TABLE 3.1: BILATERAL FREE TRADE AGREEMENTS IN THE CIS

	Arm	Aze	Geo	Kyr	Mol	Taj	Uzb	Bel	Kaz	Rus	Tur	Ukr
Armenia	X	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes, w/ exe.	Yes, w/ exe.	No	Yes
Azerbaijan	No	X	Yes	No	Yes	No	No	No	Yes, w/ exe.	Yes, w/ exe.	No	Yes
Georgia	Yes	Yes	X	No	Yes	No	Yes	No	No	Yes, w/ exe.	Yes	Yes
Kyrgyz Rep.	Yes	No	No	X	Yes	No	Yes	No	Yes, w/ exe.	Yes, w/ exe.	No	Yes
Moldova	Yes	No	No	Yes	X	No	Yes	Yes	Yes	Yes, w/ exe.	Yes ?	Yes
Tajikistan	Yes	No	No	No	Yes	X	No	No	Yes, w/ exe.	Yes, w/ exe.	No	No
Uzbekistan	Yes	No	Yes	Yes	Yes	No	X	No	No	Yes, w/ exe.	No	No
Belarus	Yes	No	No	No	Yes, w/ exe.	No	No	X	No	Yes, w/ exe.	No	Yes, w/ exe.
Kazakhstan	Yes, w/ exe.	Yes, w/ exe.	Yes, w/ exe.	Yes, w/ exe.	Yes	Yes, w/ exe.	No	No	X	Yes, w/ exe.	No	Yes, w/ exe.
Russia	Yes, w/ exe.	Yes, w/ exe.	Yes, w/ exe.	Yes, w/ exe.	Yes, w/ exe.	Yes	Yes, w/ exe.	Yes, w/ exe.	Yes, w/ exe.	X	Yes, w/ exe.	Yes, w/ exe.
Turkmenistan	No	No	Yes	No	Yes	No	No	No	No	Yes, w/ exe.	X	Yes, w/ exe.
Ukraine	Yes	Yes	Yes	Yes	Yes, w/ exe.	No	No	Yes, w/ exe.	Yes, w/ exe.	Yes, w/ exe.	Yes, w/ exe.	X