UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

TOWARDS A KNOWLEDGE-BASED ECONOMY

KYRGYZSTAN

COUNTRY READINESS ASSESSMENT REPORT

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FOREWORD

The last decades of the 20th century have represented a turning point in the global development process. It is knowledge that has become the engine of the social, economic and cultural development in the today's world. Knowledge-intensive economic activities are now a factor of production of strategic importance in the leading countries. They have also become the main indicator of the level of development and the readiness of every country for a further economic and cultural growth in the 21st century. Taking into consideration all these factors, the United Nations Economic Commission for Europe has launched an initiative of monitoring and analyzing the development of the knowledge-based economy in all the European countries in transition and emerging market economies.

The major goal of this initiative is to stimulate the exchange of national experiences, to identify best practices and to promote region-wide and global-wide cooperation of the UNECE member States, which would accelerate the development of a knowledge-based economy in the countries in transition and emerging market economies. It envisages the preparation of country assessment reports on the biennium basis by national experts, nominated by the Governments, the creation of a High-Level Task Force on the Knowledge-Based Economy, which will consider the reports and provide policy advice and recommendations to the participating countries, and the development of progress measurements and indicators, policy guidelines and tools to assist countries in overcoming obstacles to the development of a knowledge-based economy.

We hope that the country assessment reports, showing a detailed level of the countries' potential and providing information on various approaches and solutions, will help policy-makers to take strategic decisions with regards to the challenges facing them in the development of institutions, information and innovation systems, human resources development and other areas crucial for the development of a knowledge-based economy.

Brigita Schmőgnerová
Executive Secretary
United Nations Economic Commission for Europe

PREFACE

The industrial revolution of the 19th century and the scientific revolution of the 20th century have prepared the conditions for the rise of the knowledge-based economy. Economic activities associated with the production and utilization of information and knowledge have become an engine of economic growth in the developed market economies, increasingly transforming all the other dimensions of development and the entire societal ***modus vivendi*** and ***modus operanti*** of the humanity.

What do we mean by "the knowledge-based economy"?

It is not just the digital economy, which incorporates the production and use of computers and telecommunication equipment. It is not quite the networked economy, which incorporates the telecommunication and networking growth during the last decades and its impact on human progress.

The knowledge-based economy is a much complex and broader phenomenon. There are different dimensions and aspects of the knowledge-based economy:

1. The knowledge-based economy has a very powerful technological driving force – a rapid growth of information and telecommunication technologies (ICT). Every three – four year there appears a new generation of ICT. Today, the ICT companies are among the largest corporations. The ICT sector is among the fastest growing economic sectors.

2. Telecommunication and networking, stimulated by a rapid growth of ICTs, have penetrated all the spheres of human activity, forcing them to work into an absolutely new mode and creating new spheres. The information society has become a reality.

3. Knowledge, based on information and supported by cultural and spiritual values, has become an independent force and the most decisive factor of social, economic, technological and cultural transformation.

4. The knowledge-based economy has allowed a quick integration of the enormous intellectual resources of economies in transition into the European intellectual pool, stimulating the development of the former countries. Every country can benefit from developing a knowledge-based economy to become a more equal participant in the global development process.

5. The emerging knowledge-based economy has been affecting other areas of societal activity in every country, including institutional and innovation system, human resources development and etc. and visa versa. The knowledge-based economy has become an engine of progress in every country. If a country is developed, it has a developed knowledge-based economy, if a country is lagging behind, a knowledge-based economy constitutes just a small fraction of its economy.

The report below was prepared by a national expert, nominated by the Government, and represents an overview of the present situation and an assessment of the emerging trends in all the major areas, constituting the foundation of the knowledge-based economy, such as policy and policy instruments, institutional regime, ICT infrastructure, information system, national innovation capacities and capabilities.

Contents

Introduction

The modern trend of globalisation in the world community reflects the rapid developments and innovations in information and communication technologies (ICT) of the last decade. The swift advancement of ICT has made it possible to bring together people, economies and cultures. However, more than 850 million people in developing countries are still excluded from this process and remain greatly isolated from the information and progress inherent in science and technology today.

The Kyrgyz Republic is a landlocked country, endowed with few natural resources, but it has a tremendously advantageous location on the major crossroads between Asia and Europe. The development of Euro–Asian transport projects will, however, require a wide range of telecommunication services to serve the day-to-day operations of the transport corridor. The country also has potential in industries such as the hydro-electric production, tourism, and management of water resources, each of which require sophisticated information processing.

With the help of the World Bank, the EBRD and other international agencies, a basic telecommunications infrastructure has been built in the Kyrgyz Republic. USAID, UNDP and ADB have sponsored development of the network software applications for state agencies and the educational sector. The NATO Science Programme is supporting the National Research and Educational Network (NREN) through provision of satellite communication services for the Kyrgyz academic sector. The Trans-Eurasia fiber optical line (Shanghai – Frankfurt) goes through the territory of this country and is providing access to the World Internet at a capacity of 622 Mbps.

The educational level is very high in the Kyrgyz Republic, producing many highly-qualified domestic IT specialists. This offers a challenge for the Kyrgyz Republic to improve linkage with industrialised countries through the rapid development of the telecommunications sector.

1. National Strategy and Action Plan

1.1 National strategy

The Decree of the President of the Kyrgyz Republic PD № 54 On the National Strategy 'Information and Communication Technologies for Development in the Kyrgyz Republic', entered into force on 10 March 2002. The strategy includes the following five chapters:

- Introduction
- Main objectives, tasks and priorities of the National Strategy
- Main principles and directions of the national ICT policy
- State support in the development of the priority areas of the national strategy
- Organizational, economic and financial mechanisms in implementation and monitoring of the national strategy

1.1.1 Introduction

All social relationships have been fundamentally changed by modern information and communication technologies (ICT) that have established a new information society. New technologies alter not only how goods and services are produced, but also create new opportunities in the spheres of civic rights, personal development, knowledge gathering, education for the younger generation and leisure time activities. In an information society the importance of geographical distance is diminished, globalisation occurs, and there are unprecedented opportunities for regional development.

During recent years the Kyrgyz Republic has made considerable progress in the development of an information infrastructure, and in the informatisation of state organisations and private companies. This has required the development of relevant legislative and the improvement of education levels. The first telecommunications project and TAE Projects have been completed; the State Computer Network (SCN hereinafter) has been established; information projects are being carried out in various economic sectors; and Internet pages of state and non-governmental organizations and commercial structures are being created. Alluding to this, the President of the Kyrgyz Republic, Askar Akaev, declared in the World Economic Forum in Davos (Switzerland) in 1998: 'Kyrgyzstan chooses the informational society'.

Problems with ICT development in the Kyrgyz Republic have demonstrated the need to move away from a one-sided policy of just developing communications and information technologies, to the formulation of a nation-wide strategy for integration with the world information society. Given the technological opportunities already available, main policy directions could include the formation of an interconnecting information space in the country; and the development of information resources, data bases, knowledge and information infrastructures, which could be used by both state structures and the general public on the parity basis. These directions will involve the development of informational law, technological facilities, and organisations.

The National Strategy 'Information and Communication Technologies for Development in the Kyrgyz Republic' (National Strategy) sets out the main priorities, objectives and tasks, principles, provisions and directions of the national ICT policy. The National Strategy is viewed as an important area for development for implementation of the Complex Development Framework up to 2010 (CDF hereinafter). ICT provides opportunities to achieve CDF objectives, accelerate economic development and reduce poverty. ICT has the potential to become a catalyst and a driving force in the development of Kyrgyzstan.

Potential benefits from ICT development include: achievement of effective management; increased labour productivity; availability of new export opportunities, in particular in the area of software exporting and delivery of ICT services; provision of information to farmers on agricultural markets and weather conditions; creation of primary consultative medical assistance; expansion of distance learning capabilities; improved cooperation between the state, local communities and private sector in regions; and an improved quality of state services rendered to the general population. ICT sector share in GDP needs to increase to 5% by 2010.

The National Strategy also describes the organisational, economic and financial mechanisms necessary for its implementation. The mechanisms are based on a targeted programme which respects and is subject to regular monitoring and transparency execution. These mechanisms reflect the speech made by the President of the Kyrgyz Republic, Mr A. Akaev, during the First

National ICT Summit held on 27-28 April, 2001 in Bishkek. During the summit, the President proposed the following:

- the creation of a permanent agency in charge of the implementation of the National Strategy;
- the need to identify a person responsible for ICT development in each ministry and agency;
- the creation of an ICT Development Fund;
- the establishment of an ongoing monitoring scheme in this area.

The National Strategy determines the basics of funding for ICT development, stipulating; a rational use of funds for the development and modernisation of projects and mass media in various sectors and regions; an increasingly transparent and targeted use of funds.

The National ICT Strategy is designed to solve the problem of growing 'digital inequality' between industrially advanced and developing countries, as well as internally - between the centre of the Kyrgyz Republic and its regions. In eradicating 'digital inequality' and promoting regional cooperation in Central Asia, an important role will be played by international projects intended for the creation or use of satellite telecommunication systems (Silk Sat, Virtual Silk Road).

Representatives of different ministries and agencies, international organisations, civil society and the private sector have participated in the ICT Strategy development. Free Internet discussion has taken place in addition to a round table with the participation of representatives from the public sector, civil society, private businesses, and international organisations. It is noteworthy that the development of the National ICT Strategy was done with the active support and direct involvement of the UNDP Resident Office in Kyrgyzstan, Internews, GIPI, and other international and non-governmental organizations.

1.1.2 Main objectives, tasks and priorities of the National Strategy

1.1.2.1 Objectives

The objective of the National Strategy is to promote the establishment of an informational society in the Kyrgyz Republic and to implement CDF and the National Poverty Reduction Strategy.

To achieve this, it is necessary to develop an effective, transparent and accountable public administration through ICT application; to create an interconnected information space; and to facilitate conditions for the development of all regions of Kyrgyzstan, providing equal access to information for all citizens; to eradicate 'digital inequality' both with other countries and internally; and to reduce poverty.

1.1.2.2 Main tasks

The main tasks in this area are:

- integration with the world information community;
- eradication of digital (informational) inequality;
- human capacity building and maintenance of cultural heritage;
- development of democracy;
- building a competitive economy;
- development of the legal basis for an information society;
- promotion, in line with CDF, of a fair society that provides for stable human development and social security, and access to good quality education and health services for all citizens;
- formation and development of human capacity for the integration of the Kyrgyz Republic into the global informational economy;
- improvement of public administration mechanisms for developing the ICT market;
- increasing investment and developing and implementing new ICTs; and
- informatisation of management and monitoring in the public health system.

1.1.2.3 Main priorities

The main priorities of the National Strategy are:

- public administration and local self-government (e-governance) – developing effective, transparent and accountable public administration through utilisation of ICT;
- education – developing human capacity building and training of staff in ICT; and
- the electronic economy (information business, electronic commerce, regional business center in Central Asia).

1.1.3 Main principles and directions of the national ICT policy

1.1.3.1 Main principles of the national ICT policy

- **systematic character**: a systematic approach to the development and utilisation of ICT providing for coordinated ICT and CDF objectives;
- Openness: all main activities of the ICT policy are openly discussed in society with public opinion being taken into account by the state;
- **accessibility**: every citizen has the right to approach state bodies, social organisations, private and other structures in relation to issues touching upon his/her main rights and freedoms, and to gain access to the required information;
- **principle of 'the first leader':** direct interest and participation in informatisation by top managers of public administration bodies, organisations, institutions etc.;
- **principle of ongoing development and flexibility of informational infrastructure**;
- **social orientation**: basic measures of the national ICT policy are directed towards the provision of the social interests of citizens and giving priority funding to corresponding ICT programmes;
- **principle of a sufficient legislative basis for ICT**: the rule of law, steadfast observance of ICT legislation; legal equality of all those involved in ICT activities regardless of their political, social, and economic status;
- **security of information**: the observance of constitutional rights and freedoms of citizens to gain access to and use the information they seek. This includes access to trustworthy information concerning state policy, and includes the introduction of modern information technologies and protection of information resources.

1.1.3.2 Improvement of public administration and local self-governance through ICT application

Objective – effective, transparent and accountable public administration and local self-governance through ICT application;

Main directions:

- mastering of information systems and implementation of the 'first leader' principle by the staff of public administration and local self-governance.
- 'E-governance' ie. electronic document turnover; portal for the civil service; state registers and automated systems for servicing citizens; sector, regional and local data bases.
- development of a personnel policy suitable for the ICT context. Stage-by-stage training of civil servants at all levels to enable the introduction of electronic document turnover.
- further development of the SCN as the informational infrastructure base for public administration, both at central and regional levels.

1.1.3.3 Education – human capacity building and training of staff

Objective: human capacity building in the ICT area, strengthening of the ICT sector capacity, and creation of favourable conditions to enable sustainable economic growth.

Main directions:

- informatisation of education and educational management; ensuring basic computer literacy; development and introduction of educational standards in the area of ICT at all levels; introduction of computerized teaching technologies; full computerisation of basic schools; and the creation of public information points to ensure free access to the Internet for socially vulnerable groups;
- development of human resources and of the capacities of staff employed in the ICT sector; development of multilevel professional education in ICT taking into account the labour market situation; progressing with development of the informational industry and electronic commerce; creation of favourable conditions for a sustainable economic growth; and integration of the Kyrgyz Republic into the global information economy;
- application of ICT for adult training; creation of ICT - based distance learning systems, electronic textbooks and computer-based training systems to provide additional education; teacher retraining; promoting the mastering of informational systems by the staff of public administration and local self-governance;
- creation of a separate National Information centre, national and corporative computer networks for scientific and educational purposes with gradual formation of the interconnecting virtual scientific and educational space; creation of new information points; accumulation of scientific and educational information resources; promotion of scientific connections; promotion of access to world information resources; and integration into the world scientific and educational space.

1.1.3.4 Electronic economy

Objective: creation of favourable conditions for the use of ICT for effective business and to produce greater consumer satisfaction relating to products and services; formation of an electronic economy which takes into account the population's high level of education.

Main directions for information business:

- development of the information business, software production, and support for domestic companies going out to ICT foreign markets;
- promotion of private sector investments in ICT, and the development of the export capacity of private enterprises.

Main directions for electronic commerce:

- development of electronic commerce, business and marketing via the Internet, strengthening the export capacity of private enterprises through promotion of domestic goods and services using Internet opportunities;
- development of private entrepreneurship as the main driving force for development of the information and communications infrastructure in the Kyrgyz Republic.

Central Asian Regional ICT Business Centre: aims to become a regional leader in the area of information–communications service in vital sectors of the economy, such as banking, business management etc. Aims to form regional centres for Central Asia in Kyrgyzstan.

1.1.4 State support in the development of the priority areas of the national strategy

1.1.4.1 Development of ICT-related legislation

Objective: establishment of legal bases for wide use of information-communication technologies in civil society, economy, public administration, and in the state's relations with citizens and organizations.
The rule-making process ought to be transparent and open. Citizens should have access to legislative regulations of the Kyrgyz Republic in different forms, including via the Internet, as established by the republic's legislation.

The main directions in which legislation regulating the ICT area is developing are:

- increasing access to information: ensuring the right of individuals to access socially significant information without violating principles of information openness;
- intellectual property: adequately protecting intellectual property in the ICT area;
- ensuring the creation of: equal conditions for competitiveness and the elimination of monopolies in the information and telecommunications market, as well as in that of products and technologies; and favorable conditions for attracting investment;
- digital contracts: adoption of legislative acts in the area of electronic trade (digital bargains), admitting coded electronic cards (smart-cards), digital money, cyber-cash and digital signatures;
- taxation: improvement of tax policy to stimulate development of electronic commerce and provision of electronic services; legislation on offshore programming;
- legislative regulation of entrepreneurship activity in ICT area should ensure transparent procedures of licensing and certification, and eliminate non-justifiable barriers to business development;
- protection of consumers and of private life;
- computer crimes: effective measures to fight online fraud and hackers, with simultaneous reservation of anonymity and limitation of state control;
- harmonization of the Republic's information legislation with standards of international law.

1.1.4.2 Development of infrastructure for informatisation

Objective: development of information and telecommunication infrastructure as well as other kinds of communication for to ensure the participatory approach highlighted by leaders of the Great Eight in August 2000 in Okinava City in their Charter on the Global Information Society: all people everywhere and without exception should be ensured opportunities to benefit from the advantages of an information society.

Main tasks:

- ensuring the technical opportunity for access by the whole population - private, non-governmental and state organisations - to information and telecommunication services;
- development of State Computer Network, scientific-educational computer networks, and commercial systems of telecommunications as the bases of the information infrastructure of society, the economy, public administration, education and public

health;
- construction of a new model for the internal information-communication infrastructure of the republic, supporting both traditional technologies and the technologies of the new generation;
- to achieve 100% coverage of the country's territory by radio and television broadcasting on the bases of new technologies;
- to triple density of telephone numbers in the countryside.

1.1.4.3 Ensuring security of information

Objective: to ensure information security is protecting national interests in the area of information, as defined by an aggregate of the balanced interests of citizens, society and the state.

Main directions:
- defense of information resources and information systems from unapproved access, and ensuring security for information and telecommunication systems;
- observance of the rights and freedom of the public to access and use information, ensuring the spiritual rehabilitation of the people, the maintenance and strengthening of society's moral values, of its traditions of patriotism and humanism, and of the country's cultural and scientific capacity;
- Ensuring a supply of information compatible with the state's policy of offering its own citizens and the international community honest information regarding government policy, and the official position of the state on socially significant events in domestic and international life. Ensuring citizens have access to open state information resources.

1.1.4.4 ICT and civil society development. Building partnership with different sectors

Objective: to promote the solution of social problems; to strengthen the democratisation process in the country; to use modern information technologies for a timely and independent coverage of events; and to increase the role of NGOs.

Main directions:
- effective ICT use in bridging partnership relations between different sectors of the country and of society engaged in different activities; implementing social programs and establishing an information society;
- ICT application in the improvement of citizens' education and the protection of interests of different groups of population;
- attraction of social attention to key events in social, economic and political life of the country; involvement of NGOs in activities supporting the poorer layers of the population;
- development of the information resources network for NGOs and population.

1.1.5 Organisational, economic and financial mechanisms to implement and monitor national strategy

1.1.5.1 Methodology for the ICT strategy implementation

To achieve the goals set by the National Strategy requires the creation of effective organisational, economic and financial mechanisms that: stimulate ICT development, information infrastructure and information industry; create a favorable investment climate for the strategy's implementation; optimise utilisation of financial resources allocated to ICT development; and regularly monitor and evaluate the current status of the National Strategy implementation.

The methodology for preparing and implementing the National Strategy includes preparation of a medium-term strategy for a period of five years, a government programme of information and communication technologies development in the Kyrgyz Republic, and annual preparations and implementation of the Action plan on the National Strategy implementation. The National Strategy was developed in line with the Comprehensive Development Frameworks.

To evaluate current status of ICT in Kyrgyzstan a methodology developed by UNDP has been used. The methodology is based on the Guidelines "Readiness for a Net World" for developing countries prepared by the Center of International Development at Harvard University. The methodology allows the assessment of the ICT development level in Kyrgyzstan at the current stage and plans its development for the near future, identifying indicators for objectives achievement. A group of experts has identified six basic dimensions in the monitoring and evaluation of ICT development in Kyrgyzstan:

- access to the Internet (opportunities of access to Internet; cost and quality of ICT nets, service and equipment);
- public administration in the information century (electronic governance);
- teaching of information technologies (integration of ICT in teaching progress, availability of training-programs for preparation of specialists in ICT sphere);
- information society (how society uses ICT for its needs, access to information for citizens),
- development of the net Economy (how business uses ICT, partnerships of business, government and civil society);
- government policy in ICT area (creation of a favourable environment for the development of the information society).

A system of indicators defining the level of readiness for a net world has been developed for each of these dimensions.

For effective formulation and implementation of the National Strategy, as well as for ensuring effective mechanisms for implementing programmes in ICT, the Government of the Kyrgyz Republic proposed an administrative management structure presented in the Programme of information-communication technologies development in the Kyrgyz Republic.

The National Strategy identifies areas where it is necessary to develop a programme of interventions in order to achieve the aims of the National Strategy. Each area will have specific projects. These projects should be developed in detail in annual program measures. Each programme's objective should be the promotion of an informational society in Kyrgyzstan and the elimination of existing barriers and problems that limit the development and application of

ICT.

1.1.5.2 Measures of National Strategy implementation

Organisational measures support the following directions:

- active propaganda of the National Strategy;
- coordination of works on informatisation of public administration bodies, various programmes and projects on ICT development;
- introduction of mechanism for the competitive selection of the targeted programmes and projects on informatisation development, and their implementation on the basis of independent expertise;
- tax-financial stimulation, and control over utilisation of funds;
- regular monitoring and evaluation of the status of the National Strategy implementation.

The Council for Information–Communication Technologies, under the President of the Kyrgyz Republic, (ICT Council) carries out the overall coordination of planned activities. The ICT Council reviews materials on the Strategy's implementation, checks the execution of programmes and projects, as well as the use of funds. A plenipotentiary executive body determined within the framework of the ICT Development Programme performs current work.

Projects and programmes for implementation of the National Strategy are directed by the ICT Council through an executive body to the Government of the Kyrgyz Republic for inclusion in the republican budget as a separate budget line.

1.1.5.3 Economic and financial measures for implementation of the National Strategy

Implementation of the National Strategy and its basic objectives should be embodied in the Programme of Information and Communicational Technologies for Development, approved by the Government of the Kyrgyz Republic.

It is expedient that financial support to national, social, scientific-technical and educational projects in ICT area be rendered through the Fund on ICT Development created especially by the Kyrgyz Republic Government. The ICT Development Fund accumulates funds of the state budget, non-budgetary resources, credits, investments and commercial funds attracted in accordance with legislation of the Kyrgyz Republic. ICT programs and projects are financed from the ICT Development Fund.

Necessary interventions for the ICT area are:

- creation of an effective mechanism for attraction of investments, and accumulation, coordination and distribution of resources;
- effective monitoring and control over the use of these resources;
- ensuring correlation of financing with a strategy for development of a uniform information space in the Kyrgyz Republic.

An executive body, authorised by the Government of the Kyrgyz Republic, conducts analytical work regarding the status of ICT development in the republic, and produces the summary report on expenditures on ICT development for an accounting year. The results of the budget execution are submitted by the given body to the ICT Council, the Government of the Kyrgyz Republic and the Ministry of Finance of the Kyrgyz Republic. The ICT Council reviews proposals on financing

the branches and recommends to the Government of the Kyrgyz Republic adoption of the corresponding measures.

1.1.5.4 Monitoring and evaluation system creation to track implementation of the National Strategy

Monitoring and evaluation of ICT development should be placed as a priority task of the national information policy.

Some components of the system of monitoring and evaluation of the status of ICT development in the country have been already created. The President's Decree of 18 June 2001, №199 'On the Council on Information and Communicational Technologies under the President of the Kyrgyz Republic' established the ICT Council. The Kyrgyz Republic Government's Resolutions of 8 November 2001, №697 and of 23 July 2001, №367 adopted correspondingly the Program on ICT development in the Kyrgyz Republic, and the Regulations for operations of public administration bodies in the State Computer Network according to which a responsible ICT staff position should be created in all public administration bodies and local state administrations. The Ministry of Justice of the Kyrgyz Republic has registered the Center of ICT Development at the Ministry of Transport and Communication.

1.1.5.5 International cooperation and donor support for the National Strategy

Objective: the observance of interests of the Kyrgyz Republic in international information exchange; the inclusion of national information and telecommunication nets and resources in the global infrastructure; the attraction of investments and donors assistance; ensuring security of national information resources and information–telecommunication infrastructure.

Donors provide significant and critical support to the initiatives on ICT sector development in Kyrgyzstan. The donors' assistance is expressed in two different ways: in direct support to ICT sector capacity, and in indirect support to the sector through the application of information technologies in donors' programs and projects. As regards direct support to the sector, the activities of UNDP, World Bank and EBRD have been notable in the improvement of the overall performance of the telecommunication system. USAID assists in the use of ICT in public health and other sectors. The NATO scientific program supports the development of national academic research and educational networks. UNDP pays great attention to ICT sector development in public administration, development of human resources, and in private and civil sectors, expressed both via a number of projects and programmes in these areas, and via sponsorship of the National ICT Summit, a strategically important contribution towards the formation of Kyrgyzstan's national strategy.

Inter-state programs of partner countries include the Great Britain, Germany, the Netherlands, Denmark, Canada, USA, Turkey, Switzerland and Japan. These have had a significant effect in stimulating development of ICT sector capacity, and on the implementation of information technologies in Kyrgyzstan. At the meeting of the Great Eight countries in Okinava City in Japan, the Japanese Government expressed their intention to increase financing of programmes on capacity development of information technologies in developing countries.

For ICT development in Kyrgyzstan it is very important that international organisations and donor countries continue their strategic support for the ICT sector. Donating finance in this way will be a priority programme, allowing donors to play an active part in formation and implementation of the National Strategy.

1.2 Action Plan

State Plan for the development of ICTs in the Kyrgyz Republic

Legislature:

- preparation of a legal basis for the circulation of documents in digital form;
- elimination of administrative barriers when entering external ICT markets;
- Provision of equal access to information.

Economics and infrastructure:

- creation of corporate networks to improve management and decision making;
- creating a database of products;
- providing access to world markets for different sectors;
- establishing a private sector in ICTs;
- improvement of the communications infrastructure in the Kyrgyz Republic;
- increased access to international super highways for better integration of the national infrastructure into the global information system.

Defense and law enforcement agencies:

- development of state policy in the field of informational safety;
- development of scientific and practical basics in informational safety in accordance with the modern geo-political situation and economic development;
- development of modern methods of protecting information, especially in defense management and ecologically dangerous industries;
- improvement of cooperation with international organizations in the field of scientific, legal and technical aspects of information safety.

Social sector:

- implementation of ICT for realisation of the Comprehensive Development Framework programme and the National Poverty Alleviation programme;
- informatisation of education and management of knowledge;
- informatisation of monitoring and management of the healthcare system.

Financial sector:

It is necessary to create the following:

- electronic trade infrastructure, including a system of information marketing centers;
- electronic system for state purchases;
- database of goods and services.

Programme activities for the development of ICTs in the Kyrgyz Republic

#	Activity	Realisation	Responsible parties	Duration
1. Improvement of legislature in state and local management based on ICTs ("electronic government")				
1.1	Training of state employees in IT	Training programme	Ministry of Education, Ministry of Transport and Communications	2002 – 2010
1.2	Development of the State Computer Network	Efficient system for State Computer Network	Informatisation and Telecommunications Dept. of the President's Office Administration	2002 – 2010
1.3	Regional Programme on Information Communication Technologies	Information systems of the local governments	Local governments, Informatisation and Telecommunications Dept. of the President's Office Administration	2002 – 2010
1.4	Development of legislation in the ICT sector	Concept of legal development in ICT field	Ministry of Transport and Communications, Ministry of Justice	2002 – 2004
1.5	Hardware and software support to the legal information center	Hardware and software	Ministry of Justice	2003 – 2010
1.6	Monitoring and Evaluation of the ICT programmes	Analytical materials on the National strategy	Ministry of Transport and Communications, State Communication Agency, Ministry of Education	2002 – 2010
1.7	Corporate network "Statistics"	Working distributed information system	National Statistics Committee	2003 – 2004
1.8	Computer management system of the Ministry of Ecology and Emergency Situations	Corporate information system	Ministry of Ecology and Emergency Situations	2003 – 2005
1.9	Creation of the Real Estate geo-information system	Real Estate geo-information system	State Agency on Rights Registration on Real Estate	2002 – 2005
1.10	Information system "Geology"	Software and hardware	State Agency on Geology and Mineral Resources	2003 – 2005
1.11	Information system of the State Anti-monopoly Policy Committee	Corporate network	State Anti-monopoly Policy Committee	2002
1.12	Drug Trafficking Control Information analytical Internet center	Software and hardware	State Committee on Drugs Control	2002 – 2003
2. Economics sector and infrastructure				
2.1	Creation of database of domestically produced goods	Database	Ministry of Foreign Trade and Industry	2003 – 2010
2.2	Development of electronic trade software application for goods produced by domestic companies	Software application package	Ministry of Foreign Trade and Industry	2003 – 2010
2.3	Creation of the corporate computer network for agriculture	Automatic management system	Ministry of Agriculture, water resources and re-processing industry	2002 – 2005
2.4	Creation of the integrated automatic working places in the construction industry	Software/hardware	State Commission on Architecture and Construction	2003 – 2010
2.5	"Construction" database development	Software/hardware	State Commission on Architecture and Construction	2002 – 2004

2.6	Creation and maintenance of the geo-information system "Construction"	Software/hardware	State Commission on Architecture and Construction	2004 – 2008
2.7	Computer management system for support of entrepreneurship	Information processing	State Commission on the Development of Entrepreneurship	2003 – 2005
2.8	Computer management system "Transport and roads"	Software/hardware	Ministry of Transport and Communications	2003 – 2005
2.9	Computer management system "Post office"	Software/hardware	Ministry of Transport and Communications	2003 – 2005
2.10	Network of enterprises providing integrated information communication services for remote areas.	Software/hardware	Ministry of Finance, Ministry of Transport and Communications	2003 – 2010
2.11	Information system "Standardisation, metrology, certification, accreditation"	Information system	Kyrgyzstandart	2002 – 2010
2.12	State Computer Network users service system	Network of service delivery units of the State Computer Network	Ministry of Transport and Communications, Informatisation and Telecommunications Dept. of the President's Office Administration	2002 – 2005
2.13	Creation of the database "Forest"	Software/hardware	State Forestry Service	
2.14	Geo-information system of forestry sector	Software/hardware	State Forestry Service	
3. Defense and law enforcement agencies sector				
3.1	Purchase of network devices and creation of LANs for departments of the Ministry of Defense	LAN	Ministry of Defense	2002 – 2003
3.2	Automatisation of departmental activities within the Ministry of Defense	Software/hardware	Ministry of Defense	2002 – 2003
3.3	Creation of network of distant learning centers	Software/hardware	Ministry of Defense	2002 – 2003
3.4	Establishing audio and video conferences within the Ministry of Defense	Multi-media	Ministry of Defense	2002 – 2003
3.5	Providing electronic document exchange within the Ministry of Defense	Information network	Ministry of Defense	2002 - 2004
3.6	Automatisation of military recruitment centers	Software/hardware	Ministry of Defense	2002 - 2004
3.7	Creation of databases within the Ministry of Defense	Database	Ministry of Defense	2002 - 2006
3.8	Information technology system of the Ministry of Defense	Information network	Ministry of Defense	2002 - 2006
3.9	Telecommunication project of the data transfer system "Atlas C.I.S."	Atlas C.I.S project	National Security Service	2003 – 2010
3.10	Automatic system for the collection, processing and retrieval of data for border patrol in C.I.S. countries	Information system	National Security Service	2003 - 2005

3.11	Creation of reserved radio communication channels	Reserved channels system	National Security Service	2003 – 2005
3.12	Development of a strategy and management in information protection. Software and hardware protection methods. Access to databases and network resources	Analytical center on information safety	National Security Service, Ministry of Transport and Communications	2003 – 2005
3.13	Creation of the corporate network (Republic – Province – County)	Corporate network	Ministry of Internal Affairs	2002 – 2003
4. Social sector				
4.1	Providing educational institutions with computers and telecommunications equipment	Computer classes	Ministry of Finance, Ministry of Education	2002 – 2010
4.2	Creation of the new generation of textbooks and learning materials on ICT for schools and universities. Development of electronic libraries.	Learning materials	Ministry of Education	2002 – 2010
4.3	Creation of a corporate information system for healthcare	Software/hardware	Ministry of Healthcare	2002 – 2005
4.4	Information consultation centres on social affairs at provincial centers (electronic labor exchange)	Software/hardware	Ministry of Trade and Social Protection. Local state administrations and local governments.	2002 – 2004
4.5	Creation of a computer system for identification in the employment sector	Software/hardware	Ministry of Trade and Social Protection	2002 – 2005
4.6	Creation of a computer system on “Social passport of the family” database support	Software/hardware	Ministry of Trade and Social Protection	2002 – 2005
5. Financial sector				
5.1	National information marketing centre within C.I.S. countries network	Software/hardware	Ministry of Finance, Ministry of Transport and Communications	2002 – 2004
5.2	Development of an electronic payment system	Electronic payment	Ministry of Finance, Ministry of Transport and Communications, National Bank	2002 – 2004
5.3	Unification of personal ID number	Integration of databases of the Social Fund and the Ministry of Trade and Social Protection	Ministry of Trade and Social Protection, Social Fund	2002 – 2003
5.4	Electronic trade project	Internet shops	Ministry of Foreign Trade and Industry, Ministry of Transport and Communications	2002 – 2005

2. The Institutional Regime

The importance of ICT for the overall socio-economic development of Kyrgyzstan has been recognized at the most senior government level. President A. Akaev declared in Davos in 1998 that "Kyrgyzstan opts for an information society". Since that time, numerous decrees and normative acts have been adopted to create suitable conditions for ICT development in the country.

Since 2000, a Global Internet Program Initiative (GIPI) by Internews Networks has been actively involved in the creation of a favourable legal environment for the development of Internet related issues. The GIPI project is working together with state institutions, NGOs and the commercial sector.

The First National ICT Summit took place in February 2001. Significant attention at the Summit was devoted to the development of a legal basis for ICT, and a national legal framework for ICT was presented and discussed.

The primary obstacle to telecommunications development in the republic, is Kyrgyztelecom's monopoly over international. This originates from the necessity pay back a loan taken from the World Bank and EBRD for the First Telecommunications project. The regulations associated with this do not allow the legal development of IP telephony in the country. As a result of Kyrgyzstan's entry to the WTO, it has been decided to abolish the exclusive rights of Kyrgyztelecom from 2003 to 2008. A further step towards the de-monopolisation of the telecommunications industry has been taken with the development of the "Concept on reorganisation and privatisation of the joint stock venture Kyrgyztelecom".

Executive power in the field of informatisation belongs to the following agencies:

- Ministry of Transport and Communications
- State Communication Agency
- State Commission on radio frequencies

Based on the discussions and recommendations of the First National ICT Summit, the State ICT Council was created in June 2001 with President A. Akaev as Chairman. This body is determines strategy, state policy and legal aspects for ICT development, and any major programmes and initiatives in this field now need the approval of the ICT Council.

The Ministry of Transport and Communications is responsible for the following:

- development of state policy in electronic and traditional mail;
- preparation of normative acts relating to electronic mail and to post offices inside the country and at an international level;
- conduct of negotiations on communications with foreign states.

The State Commission on Radio Frequencies is responsible for the following:

- development of regulations regarding the use of radio frequencies;
- creation of the National Table on frequencies and long-term development of radio

communications in the Kyrgyz Republic.

The National Communication Agency is responsible for the following:

- monitoring and support of competition between operators;
- provision of equal access to electric communications networks;
- monitoring of conditions for the general public to use electriconic communications networks;
- creation, development and use of the state system of radio control;
- preparation, control and monitoring of the national telephone numbers system;
- monitoring of the quality of communication services;
- provision of radio frequencies to users.

The "Regulation on the Coordination Council on satellite technologies under the President of the Kyrgyz Republic" was approved.

The following ICT related normative acts are in place in the Kyrgyz Republic:

- "About electronic and mail communications";
- "About informatisation";
- "About legal protection of programmes for computers and databases";
- "About topologies of integral microchips";
- "About scientific technical information";
- "About obligatory sets of documents";
- "About electronic payments";
- "About electronic signatures".

In order to provide legal support to the development of information technologies, it is necessary to provide the following:

- transparency of state institutions;
- regulation of monopolies in telecommunications;
- legal regulation of new relationships arising from the development of information technologies.

The "Concept of informatisation development" was approved by the President in February 1998, and aimed at creating favourable conditions to satisfy the information needs of the society. It includes:

- regulation of ownership of information;
- rights of private and legal entities to information;
- regulation of access to information;
- safety of information and telecommunication systems;
- information safety of the state, the society, and the individual;
- responsibilities of the members of the information environment.

The law "About informatisation" of 1999 states that informatisation is a stand-alone field in the economy of the Kyrgyz Republic. This law defines the following terms: informatisation infrastructure, state and non-governmental information systems, information resources, protection

of information.

The laws "About legal protection of computer programs and databases" and "About legal protection of chips" have been approved.

A decree on punishment for computer information crimes exists in the legislation of the Kyrgyz Republic. However, there are no decrees in the field of management of state and non-governmental information resources.

The decree "About insurance of information risks" has not yet been issued. Use of modern technologies can cause financial losses as a result of information risks, and insurance is seen as the solution to this problem.

An association of communication operators was established in the Kyrgyz Republic in 2001. The association has actively participated in the formulation of normative acts in the information technologies field. Recently, the association opposed an attempt by Kyrgyztelecom to charge payments for local phone calls on a time basis. Such a step would negatively affect the majority of Internet users who use dial-up access.

3. Present Situation and Trends in the Country's Informational System

3.1 Main Telecommunication projects

The First Telecommunication project was funded via a loan from the World Bank and EBRD to the Kyrgyz Government. The budget of the project was 27,400,000 U.S.D. As a result of this project, the telecommunications infrastructure of the country has been improved considerably:

- earth satellite stations of the standards A, F and B were installed;
- a network connecting regional centers was reconstructed;
- digital telephone stations were built in Bishkek and regional centers;
- digital telephone stations in Bishkek were linked by fiber optic cables, with the help of SDH technology.

The Chuy Telecommunication project was financed via a loan from the Korean Government of 12,000,000 U.S.D. Digital telephone stations with a capacity of 43 784 lines were established in the Chuy valley. A fiber optic line Bishkek – Kant – Ivanovka – Tokmok – Kemin was built.

The Osh Telecommunication project was funded by the Kuwait Fund of Arabic Economic Development, with a sum of 8,700,000 U.S.D. It was used to modernise telecommunications infrastructure in the south of the country, including Osh, Jalal – Abad and Batken provinces. Digital telephone stations with a capacity of 23 400 numbers were installed in Osh City and regional centres.

The Trans – Asia – Europe Fiber Optic line, connecting Shanghai, China and Frankfurt – on – Main, Germany, goes through the territory of the Kyrgyz Republic. Right now, eight countries (China, Romania, Hungary, Austria, Iran, Poland, Germany, and the Kyrgyz Republic) have completed their segments, and the total length of the TAE is 27,000 km. In some places in Kyrgyzstan, access to the backbone will be done through radio-relay communication facilities by NERA Co. This backbone will provide access to many countries in Europe and Asia with a speed of 622 Mbps.

The National Research and Educational Network (NREN) was sponsored by the NATO Science Programme. Via this project, research and educational institutions have obtained satellite backbone communication lines with a capacity of 2,5 Mbps.

3.2 Communication facilities

The prospect of participating in the development of the world's telecommunications systems has generated increased interest by entrepreneurs in the telecommunications market of Kyrgyzstan.

Current conditions

The highest growth rates among licenses for electronic communication services relate to licenses (including applications) for data transmission, for telematic services, and for the renting of channels. As a result, the total share of licenses for electronic communication, has increased by 3% during the first 11 months of 2000, totalling 23%. At the same time, the number of applications for this kind of activity is increasing.

Despite the fact that the license agreement of "Kyrgyztelecom" grants exclusive rights for long distance and international communication services until 2003 only, in reality "Kyrgyztelecom" still has a monopoly in the local communications market due to the lack of profit from local communications at current tariffs.

Traditional communication services

Currently, the fixed public telephone network of "Kyrgyztelecom" includes 475,300 lines (data from the annual report of JSC "Kyrgyztelecom" for 2000). "Kyrgyztelecom" has inherited from the former Soviet Union a hierarchical network structure that includes primary, secondary and local networks. The primary network consists of cable, radio-relay, satellite and some air trunk lines. It embraces all oblasts of Kyrgyzstan and connects them with networks of other countries through multi-channel long-distance communication equipment. Additionally, the primary network includes intra-zone and local primary networks that, in turn, include transmission systems which connect automated telephone stations (ATS). The secondary network includes equipment that provides connection from international stations to ATS, to which clients are directly connected.

Almost two thirds of the total volume of switching equipment consists of coordinate type stations which are used in rural telephone networks, while digital ones are being installed in urban areas, where high purchasing power and demand for additional services exist. As such, the dynamics of capacity being used in cities and in rural areas differ. The low level of income in rural areas, and the migration of active sectors of that population to urban zones or outside the country, have been a factor in the decrease of the ratio of telephone use in rural areas.

In December 1996, under a credit agreement between "Kyrgyztelecom" and the EBRD, a surface satellite station of "A" standard was installed. Currently, this station provides direct international access to Japan, China, Germany, Great Britain, and India, with subsequent transit to other countries of the world. Practically, with their installation of surface satellite stations of "A", "F", and "B" standards, and automated long-distance telephone station (ALDTS) with a total capacity of 2.7 thousand channels, Kyrgyz communication networks are broadly integrated with world telecommunication networks.

Moreover, construction of the Kyrgyz section of the Trans Eurasia (TE) optical line, which directly connects Shanghai, China and Frankfurt, Germany, has been completed. The total length of TE is 27,000 km, and the length of the Kyrgyz section is 183 km. International connections will be made through Synchronic Digital Hierarchy (SDH) transmission lines, with a capacity of 768 channels (622Mbs). Transmission centres in administrative and regional centers will have a capacity of 1920 channels (155Mbs). Except Bishkek, Sokuluk, Belovodskoe, Kara-Balta, and Kaindy will be connected to TE. This project will provide Kyrgyzstan with direct access to many countries of Europe and Asia.

In Bishkek, the largest and most promising communications market of the Kyrgyz republic, trunk transport communication infrastructure is being actively established. An optical cable with utilisation of SDH technologies, for the purpose of arranging inter-station connection with a data transfer speed of 622Mbs, has been installed. The capacity of the optical cable is 24 fibers. However, in spite of all the measures which have been implemented (modernization of network, creation of trunk infrastructure), the level of installation of telephones in Kyrgyzstan is still one of the lowest among CIS countries. In 2000, the level of telephone installations – the telephone density (number of telephone units, including coin telephones and state owned telephones

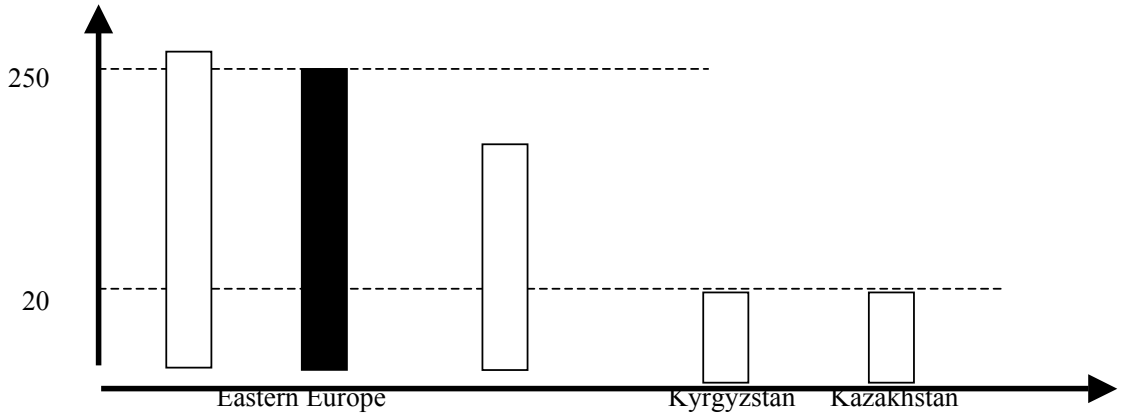
connected to the general network) was 7.5 per 100 people. In other words, with an average number of four people per family, only about 30% of households have telephones. If coin and state-owned telephones are excluded from this calculation, then the density is lower still. The International Monetary Fund considers telephone density as one of the most important economic indicators of a country's level of development.

Such a low level of telephone installations can be explained partly by features of the Kyrgyz landscape. Almost 67% of the population resides in rural mountainous areas, making telephone installation very costly and requiring substantial capital investment. Accordingly, telephone density in Kyrgyzstan is unevenly distributed.

On one hand, the low level of telephone installations indicates a potential growth market for telecommunications. On the other hand, it necessitates heavy capital investment, namely foreign investments as Kyrgyz internal investment capabilities are very low.

As in the majority of the former Soviet Union countries, Kyrgyzstan has a low volume of general telephone traffic per line. At the same time, almost all local traffic is free of charge. Only a small proportion of institutions, organizations and enterprises are charged for such traffic.

Diagram: General traffic in minutes per line, per month (data from a statistical survey)



The low traffic per line, 10 times below identical indicators in countries of Eastern Europe, underpins the theory that the communications market has substantial reserves of potential revenues.

While tariffs for international communications are the tariffs for local and national long-distance services are, by contrast, very low. They constitute a social rather than economic burden, and do not cover costs - especially those of local communication links. As a result, the present tariff system of "Kyrgyztelecom" does not allow for expansion and modernisation of the telecommunication network. In terms of revenues, the Kyrgyz telephone network is one of the poorest among the CIS countries.

Recently, new services such as pager, data transmission, Internet, and cellular communications, are developing in the communication market. The Memorandum of the World Bank does not assign a fundamental role to the participation of the National operator "Kyrgyztelecom" in the development of such market niches. The role of "Kyrgyztelecom" is to establish and provide a transport network for private operators.

Cellular communication network

Presently, mobile cellular communication is managed by two operators: "Katel and "Bitel". The cellular communication system of "Katel" is based on the American AMPS standard in its digital version. The network has been operating for more than six years, and has about 7,000 clients (expert evaluation).

Katel's base equipment was installed by "Ericsson" and "Motorola". Presently, the network covers Bishkek, Chui Oblast, Issyk-Kul Oblast, Osh, and Jalal-Abad. The estimated volume of investment is about US$ 5 million.

Bitel's cellular communication system is based on the European GSM standard. The network has been operating for more than three years, and has about 10,000 clients. Most of the equipment used is made by "Ericsson", "Siemens" and "Huawei". The GSM network covers Bishkek, Chui Oblast, northern part of Issyk-Kul Oblast, and Osh. The volume of investment is about US$ 6 million.

With the appearance of a second operator in the cellular communications market, a rapid decrease of tariffs from US $ 0.25 to 0.5 per minute to US $ 0.25 to 0.30 occurred. Subsequently, with an increase in competition, the tariffs of both companies decreased even further down to US $ 0.07 to 0.15 per minute. However, in spite of these reductions, there has been no substantial growth in the market. The primary users of cellular communication are still businessmen, international organisations and sectors of the state elite. Penetration of the market by cellular communications is only 0.4%. The world average for this indicator is between 3 and 5%, and in European countries, such as Norway and Finland, it is 60%. The primary reason for the poor penetration level of cellular communication services is low income.

Paging services

Another segment of the communication market is paging. There are three operators working in this segment: "Areopag-Page", "Smart-Page" and "Gelio-Page".

"Areopag-Page" provides services in Bishkek, Chui Oblast, Ussy-Kul Oblast, Osh and Jalal-Abad. Its clients number approximately 3,000. Russian paging technologies are used on the basis of Motorola's transmitters. In the near future, the company is planning to transfer to the "Flex" American protocol.

"Smart-Page" provides services in Bishkek, Issyk-Kul and Chui Oblasts. Its clients number approximately 2,000.

"Gelio-Page" provides services in Bishkek to approximately 500 to 700 clients.

All paging providers work on the basis of the outdated "Pocsaq" protocol, using Russian technologies. The major function of paging services includes transmission of text messages through their own operator centers. With increase of competition, tariffs have halved from US $ 20 to between US $ 9 and $ 11.

Two companies ("Areopag-Page" and "Smart-Page") have, for a long time, provided services through the Internet, omitting operator centers. Total investments made by the companies have

not exceeded US $ 500,000. However, in spite of low tariffs and strong competition, this market still attracts only mid-size investors. A Kyrgyz-Chinese joint venture also plans to provide services in the near future.

There is growth potential in this market, probably through provision of additional services. In particular, this is likely to involve making pagers into info-commutators via active use of the Internet and automation of message transmission.. Taking into consideration all of the above, and given sufficient GNP growth, the capacity of the market may reach 10 to 15 thousand clients.

Trunk telephone communication services

There are several companies working to provide radio-trunking services primarily in Bishkek and Chui Oblast on the basis of the "Smarttrunk-II" protocol. However, this market is not expected to show much further development. One exception to this concerns "Areopag-Bishkek", which installed the local "Smarttrunk-II" radio communication systems not only in Bishkek, but also in Osh and Balykchi. This company also started to implement a radio communication system on the basis of the MRT-1327 protocol.

TV broadcasting services

A special place in the market belongs to the radio-relay communication network, TV and radio broadcasting. Services in this market used to be provided by the Republican Production Union of radio-relay trunk lines, TV and radio broadcasting (RPU). However, according to the Resolution of the Government # 220, as of 25 April, RPU has entered the "Kyrgyztelecom" structure.

RPU includes companies that provide radio and TV channels to TV and radio companies, for broadcasting of their programmes over the territory of the republic, transportation of TV and radio programmes, and long distance communication channels, via radio-relay lines. Private TV and radio companies do not use the services of RPU due to their small financial capacity. State TV is transmitted via 50 stations, with the number of programmes broadcast not less than two. Bishkek and the neighbouring regions of Chui Oblast receive five TV and two radio programmes.

In the last year, "Ala-TV" company has begun to develop the cable TV market. This company is a joint-stock company and one of its investors is a well-known American company, "Metromedia". This company actively develops cable TV networks and paging services in CIS, and has begun to invest in cellular communication systems. The project is interesting because the company has started to develop its own cable industry infrastructure (mainly optical cable). The company's tariffs are not high and, as such, client interest is expected to be favourable. To date, the company has only been able to cover only a small part of Bishkek, and without expansion there is a danger the company will not be able to attract a satisfactory number of clients. However, given the rapid development of technologies, it is possible that in the years ahead, this company may become a participant in the market for local telephone communication services.

Subsequent to the introduction of card telephones, there have been some developments in the pay-for-telephone segment of the market. This project was launched by the "Telcard" company, using pay-for-telephones of the well-known French "Schlumberger" company, with subsequent transfer of the system to JSC "Kyrgyztelecom". As such "Kyrgyztelecom" still has a monopoly in the pay-for-telephone services market. Currently, "Kyrgyztelecom" operates about 1,000 coin telephones and 300 chip-card telephones. Approximately 70% of the above- mentioned telephones are in Bishkek, while the rest are distributed among oblast centers. The development

of pay-for-telephone services is possible only upon full transfer to telephones with chip-cards. Coin telephones are not well suited for accounting purposes. The transfer to a time-based calculation of telephone conversations assumes a system of advance payment for telephone cards. Merely shifting to a different technology with prepaid telephone cards could revive the pay-for-telephone market without additional, substantial investments. This could be achieved simply by re-equipping functioning coin-telephones.

3.3 Internet in the Kyrgyz Republic

3.3.1 Informational computer networks coming into being in the Kyrgyz Republic (1991-1993)

The history of informational computer networks for the public in the Kyrgyz Republic began in 1991, when a server of the "Ala-Too" telecommunications network was founded, working via Almaty's RICC server and serving about 20 subscribers.

In May 1992, the "Imfiko" ("Imfiko" firm) network subscriber gained the official status of the RELCOM network function, serving about 50 network subscribers by the end of 1992, and sending information through Russian networks.

3.3.2 History of Internet services (1994-1996)

Two companies (ElCat and AsiaInfo) were founded in 1994, and these are currently the largest Internet providers on Kyrgyz Republic territory.

The joint state-private venture firm ElCat was founded in 1994, based on the IMFIKO server of the "RELCOM" network in Kyrgyzstan, to fulfill the national network creation project. The ElCat firm provided e-mail delivery on the territory of Kyrgyzstan, connection with CIS countries and, since 1995, a full Internet services package connecting to networks all over the world.

The ASIAINFO telecommunications enterprise was founded in 1994 as the Kyrgyz branch of the INFOTEL network to provide services using the X.25 protocol. Founders of this firm were the Russian firm INFOTEL and KyrgyzTelecom. TheEnterprise provides connection with more than 200 data transfer networks using the X.25 protocol, and with the Internet society, using the TCP/IP protocol.

In 1995, one more company appeared on the network services market – Transfer LTD.

3.3.3 The early Internet development period (1997-1998)

The further development of the Internet services market in Kyrgyzstan was interrelated with the reconstruction of telecommunications. In 1997, providers and users considerably improved the quality of modems. Modems with a speed lower than 19,2 Kb/s, although widely spread, were changed for devices of V.34 and V.34+ standards (28,8/33,6 Kb/s).

During this period, for the first time non-commercial providers appeared on the Internet services market in Kyrgyzstan:

FreeNet (IRIS)	TCP/IP, FR	ElCat

Soros Foundation in Bishkek	TCP/IP, FR	AsiaInfo

Internet access services provided by FreeNet and the Soros Foundation are free because the providers themselves are non-commercial organisations and operate with the support of foreign sponsors. This Internet access is provided selectively, based on a statement made by the sponsor. In general, it is provided to educational, science or other organisations (eg. the mass media) on a competitive basis.

3.3.4 Current condition of the Internet services market in Kyrgyzstan (1999-2001)

The last two years of Internet market development have been characterised not only by an expansion of both the technical potential of providers and the number of Internet users, but also by the increasing number of services being provided.

A good indicator of Internet development during the last two years is the increase of the joint Internet access channel. While in 1998, the common channel of providers was about 768 Kb/s, in 2000, the joint channel has risen five times and amounts to more than 4 Mb/s.

In fact, the Internet access market has about 6,000 active users. The number of potential users is approximately 20,000. This category includes people that could use the Internet but do not have access to it. Free opportunities to learn about and use the Internet, provided by institutions of higher education and international organisations, considerably influence the number of potential users.

An important aspect of this Internet development period is the increase in number of Internet services, meaning that the Internet is not just an economical way to communicate. For example, Internet technologies have now been used for the first time during parliamentary and presidential elections in the Kyrgyz Republic. The State Computer-aided System "Shailoo", based on Internet technologies, enabled interactive counting of votes in every region of the Republic. For the first time, Internet radio broadcasting also took place. Carried out in cooperation with national television channels, the Interactive voting system can be added to the achievements of the last years, permitting as it did live participation of viewers in social opinion polls. Another peculiarity of this period of Internet market development is KyrgyzTelecom's, preparation to enter the Internet market, concerning which there is mixed opinion. However, the fact that the biggest communication operator in Kyrgyzstan is entering the field, demonstrates the level of competition which there will be in this market. Competition in the Internet services market is becoming increasingly tough stimulating a growth in the number of special promotions designed to attract clients. While there are special state committees to protect and develop competition, there is no guarantee that KyrgyzTelecom will not seek to pull in customers via special events where inducements from one of the other sectors in which the company has a monopoly, will be offered.

With a monopolist providing Internet services as one of its branches, these services could now be provided at lower cost. Questions, however, remain - how will the cost of services will be determined?, and will the new structure be biased, as other providers pay for services obtained from other branches of the monopoly? Even if the Internet branch of KyrgyzTelecom pays market prices, but without direct payments, then conditions of inequality appear due to differences in the cost of finance. KyrgyzTelecom can develop without any additional finance, because it monopolises communication facilities.

KyrgyzTelecom should enter the Internet services market on the basis of a warranty of

equal conditions of competition. These conditions can be determined only after full economic analysis of pricing, composition of service costs for the monopolist and determination of sharply set rules of competition in this branch, as well as an obligation to maintain transparency.

3.3.5 The web services market and Internet resources of Kyrgyzstan

Considerable change has taken place recently in the structure, technology and content of the Internet resources of Kyrgyzstan. Changes have taken place in site creation as a direct result of client demand. Competition for the attention of network users is rising, and projects initiated without precise planning and research of target audiences are doomed to fail.

While straightforward information sites were previously in demand, active websites are now the order of the day. Companies are beginning to understand the benefits of using the Internet in business. Most of the websites of local companies can be described as web-based showcases that contain general information about products or services of the company, and about the company itself. Companies are slowly moving from "Internet in Business" to "Business in Internet", in other words, business is coming to the Internet with commercial aims.

It is well known that the electronic commerce market is developing rapidly and is influencing the general direction of web services development. The simplest example is the development of web shops and electronic trading places instead of traditional web showcases. Whether a company sees the need for a web site or not, is still a management decision. However, company websites are becoming an increasingly necessary condition of successful competition in the world economy.

It is impossible to review completely and in detail the structure and content of the Internet resources of Kyrgyzstan, which total approximately five hundred in number.

3.4 Sector online software applications

State Automatic Election System Shailoo

A significant contribution to network software applications was made when the state automatic system Shailoo was created. Shailoo is a network-based software application that is designed to collect and process information for the Election Committee. Client/server technology is used to collect data from 54 rayons (counties) over the whole country into the Oracle database of the Central Election Committee in Bishkek. A sophisticated management system protects the data from being manipulated at the electronic stage of information processing. During the Election campaigns, the results of the votes are shown in real time on the World Wide Web (WWW).

Computerized Taxation System

A computerised taxation system for State Tax Inspections was implemented by the Ministry of Finance, with the participation of the Barents Group. This is a network-based software application, using the communication channels of Shailoo and PMIS corporate networks. A common information environment exists in the form of an Oracle database that is shared by the Tax Inspection Committee and the Social Fund. Branches in rural areas are sending data to Bishkek through Shailoo communication facilities.

Public Management Information System (PMIS)

A WWW-based state corporate network connects, through dedicated lines, 49 major ministries/agencies in Bishkek and six regional state bodies in Osh. Existing telephone lines are used as communication channels and network operations are functioning up to transport layer. This allows e-mail and Internet access to all users of PMIS.

Education Management System

The purpose of this project is to create a network-based information system for gathering data (teachers, administrative and technical personnel) into a database at the Ministry of Education.

4. Characteristics of the Country's Human Resources

High schools

The majority of high schools are governmental, the largest sector in the country. Currently, there are 1,680,000 children under the age of 14 years in Kyrgyzstan. In the school year 1999 to 2000, 1,100,000 pupils were studying in the country's 1,980 schools.

The High School education system prescribes an "Informatics and Information Technologies" programme for all state and private high schools. The programme is sub-divided into two stages:

- First stage (8 – 9 grades) – basic course on informatics. 102 hours in classes.
- Second stage (10 – 11 grades) –study of informatics in subjects that can be selected. In accordance with the specialisation of the school, the course may take from 68 to 136 class hours.

It should be noted, however, that programmes in informatics do not satisfy modern requirements. Most of them are oriented towards programming languages but not the use of general information technologies. Due to lack of teaching time as well as of computers, students are neither obtaining real programming skills, nor are they gaining sufficient understanding of information technologies in general.

In 1995/96, two national educational programmes "Professionals of the 21st century" and "Bilim" were adopted. The first programme stands for development of international cooperation in the field of science and education, encouraging modern technologies. The second program is devoted to the development of overall strategy in the educational sector with emphasis in the following aspects:

- preservation of the availability of education;
- increase of quality and efficiency of education;
- improvement of financing of education; and
- development of legislature in the educational field.

Recently, the Asian Development Bank has begun financing of two projects, "Information management system in education" and "Distant training system for high school teachers".

Table 1. Computers in high schools (year 2000)

Provinces	Number of schools	Number of students	IBM compatible computers	Students per computer
1. Bishkek city	119	97218	659	148
2. Batken province	188	95580	107	893
3.Jalal-Abad province	410	212409	493	430
4.Osh province	518	265128	525	505
5.Issyk-Kul province	190	93422	545	171
6. Naryn province	138	64072	228	281
7.Chuy province	310	148753	367	405
8.Talas province	107	49570	195	254
TOTAL	1980	1025792	3119	329

While some schools are equipped with modern computer classes, more than half of them do not have computer classes at all. Only a small number of schools have access to the Internet. Most of these are located in Bishkek.

According to the Harvard classification, high schools in Kyrgyzstan can be divided into three levels of readiness for the new information network world:

- more than a half of schools (56%) are at the first level of readiness (schools do not have computers at all);
- about 35-40% of schools are at the second level (schools have old modification computers (486 and less), but they are not integrated into the educational process, etc.);
- a small number of schools (mainly schools in Bishkek and private schools) are at the third level of readiness (schools with local networks, access to the web, computers widely used in the education process, etc.).

15 % of schools are equipped with computer classes and endowed with sufficient computers. There is one computer per 330 students in average. 1 to1.5 % of the total number of schools have access to the Internet.

Higher education

In accordance with data provided by the licensing department of the Ministry of Education and Culture, there are 50 educational institutions and branches of institutions from CIS countries in Kyrgyzstan. There are 188,820 students, and 101,446 are full-time students (1 October 2000). This last figure relates to educational institutions with 168,008 students, i.e. 89% of the total number of students in the country.

With respect to the number of students per computer, educational establishments can be sub-divided into four groups:

- higher educational institutions with less than 10 students per computer. There are 9,173 full-time students (10% of the total number). The number of computers is 1,545 (33.8% of the total numbers of computers). On average there are six full-time students per computer;
- higher educational institutions with 10 – 20 students per computer. There are 20,623 full-time students (22.5% of the total number) in this group. The number of computers is 1,307 (28.6%), equivalent to 16 full-time students per computer;
- higher educational institutions with 21 – 50 students per computer. In this group, there are 52,421 full-time students (57.2% of all students), for 1802 (39.5%) computers. The average is 29 full-time students per computer.
- higher educational institutions with more than 51 students per computer. In this group, there are 10,324 full-time students (11.3% of all students). The number of computers is 171 (3.7%) giving an average of 60 full-time students per computer.

The *first group* covers institutions that are small in terms of full-time students, while being sufficiently funded. All institutions are connected to the Internet through dedicated lines or through dial-up connections. Students and staff members have practical experience in working with Internet and e-mail, which is heavily used for administrative purposes. There are no old "Soviet" era institutions in this group (ie. pre-1991).

The *second group* consists of private institutions of three older institutions which were previously well-equipped with computers. All of them have Internet access and e-mail services.

The *third group,* the biggest, consists of institutions that were established recently and that are state-owned. They still have no sufficient technical infrastructure.

The *fourth group* includes state-owned institutions with little use of information communication technologies, due to their specialisation.

Table 2. Number of students and IBM compatible computers 1996 – 2000

Year	Number of students (thousands)	Number of computers	Number of students per computer
1996	77.8	1200	65
1997	97.8	1850	54
2000	188.8	5100	37

In accordance with the Harvard methodology, the situation in the Higher Educational sector is the following:

- 15 % are at stage two of readiness;
- 70 % are at stage three;
- About 10 % can be considered at stage four.

Training of IT specialists has been improved recently. Degrees are offered by numerous institutions in the following fields:

- Automatics and management of technical systems, Kyrgyz Technical University
- Telecommunications, Kyrgyz Technical University, Osh Technical University
- Electronics and microelectronics, Kyrgyz State National University, Jalal-Abad State University, Dastan University
- Computers, Systems and Networks. Information Processing and Management Systems. Software for Information Systems and Management. Kyrgyz Technical University, Kyrgyz State National University, International University of Kyrgyzstan, Kyrgyz Slavic University, Dastan University, Manas University and others
- Information Technologies in Economics. Kyrgyz Technical University, International University of Kyrgyzstan and others.
- Applied Mathematics and informatics. Kyrgyz State National University, International University of Kyrgyzstan

Most of the institutions only recently begun teaching the above-mentioned programmes, and they are targeted at the preparation of highly-qualified computer users. As a rule, they do not have laboratories for hardware study, design, and manufacturing of electronic devices and their parts.

Table 3. Number of IT students

Major	1995/96	1996/97	1997/98	1998/99	1999/00
Applied Mathematics	455	405	672	615	943
IT in Economics	111	462	1086	1605	2172
Automatics & Management	354	287	448	582	537
Computer Management	131	218	455	707	850
Electronics & Microelectronics	134	240	449	530	508
Radio technique	262	301	262	261	233
Information Technologies	1162	676	1269	1920	2408
Number of IT students	2609	2589	4641	6220	7651
Total number of students	64600	77800	97600	129700	159200

Challenges and issues, limiting ICT development in the educational sector

Insufficient development of ICT in educational institutions, and the education sector in Kyrgyzstan in general, are related to the following issues and problems:

- absence of a long-term programme to provide for computer equipment in educational establishments; access to Internet; implementation and development of information technologies in the process of education; and training of ICT specialists.
- absence of a coordinating centre for ICT development in the education sector (for example, under the Ministry of Education and Culture);
- absence of a National Educational Network, with one ISP for the educational sector;
- insufficient financing of events on ICT development at educational institutions from government and local budgets. Absence of a budget for purchase, support and development of ICT at institutional departments;
- variance of state educational standards, educational plans and programmes for creating modern conditions and perspectives in the development of ICT. This is related to ICT educational plans and programmes for pupils at high schools and students at secondary schools, as well as plans and programmes for IT specialist training;
- shortage and low salary of teachers of informatics and ICT specialists at educational institutions;
- absence of educational centers for the training of teachers of informatics and ICT specialists at educational institutions;
- absence of ISPs in the regions and at district levels;
- absence of educational literature and software in the Kyrgyz language;
- schools that are equipped with computers do not necessarily have the staff to serve them, a budget for spare parts or equipment maintenance, or paid access to the Internet.

Proposals for a national strategy for the educational sector

High school system

- improve the quality of training (including upgrading of knowledge) of teachers of informatics at high schools; foresee targeted financing from all sources (state and local budgets, budgets of educational institutions, loans, grants, sponsorship, etc.) for implementation and development of ICT in the educational sector;
- conclude establishment of distance training of high school teachers; create a national educational network with ISP functions;
- develop new educational programmes, methods and technologies of teaching «informatics» in high school, and related subjects in high and medium professional institutions, including the most recent achievements in this sphere;
- 100% computerization of high schools in Kyrgyzstan, less than 50% of them with modern computer classes; medium ratio of not more than 100 students per one computer in high schools; access to Internet of not less than 10% of high schools of Kyrgyzstan.

Higher educational institutions

- improve quality and quantity of IT specialists' training in design and development of software for information systems;
- create new educational and methodological manuals in accordance with new educational plans and programmes, including their e-versions;
- develop special councils for defending doctoral and PhD theses in ICT related fields;
- activate the creation of e-libraries with access to the Internet and world information resources in educational and scientific institutions;
- expand the National Research and Educational Network (NREN) by connecting universities in southern Bishkek and regional universities to Internet through dedicated channels. Develop distance learning by using modern educational and telecommunication technologies, providing high quality multimedia materials;
- establish a National Center of Information Technologies equipped with the most modern technology to develop human resources and train high quality specialists in ICT. The National IT Center would host different training courses, incubate IT investigation projects, create a database and assist in the promotion of e-commerce and other businesses with network use.
- equip all higher institutions with modern computer technologies and fully integrate ICT into the educational process; achieve an average ratio in all higher institutions of not more than 20 students per computer; wider usage of Internet by all higher institutions (mainly through dedicated channels)

5. National innovation capacities and capabilities and their effectiveness

In the modern world science is the driving force of public progress and it requires a well-educated population to track innovations and understand their impact.

In current times, progress depends not only on the level of scientific development in a country, but also on how deeply it penetrates into society. These observations are important for Kyrgyzstan where there have been rapid changes in the economy and society due to globalisation, and where the prestige of science has fallen to a worrying degree both at state level and in society

According to the law "About Science and about Bases of State Scientific and Technical Policy" the central body responsible for carrying out state scientific and technical policy is the Government of the Kyrgyz Republic. The State Agency on Science and Intellectual Property under the Government of the Kyrgyz Republic is responsible for the realisation of state scientific and technical policy. All activities in the field of science and technology are regulated by the following normative acts:

- Law of the Kyrgyz Republic "About Science and about Bases of State Scientific and Technical Policy"
- Law of the Kyrgyz Republic "About Innovative Activity"
- Regulations of the State Agency on Science and Intellectual Property under the Government of the Kyrgyz Republic
- Regulations of Formation and Realisation of the State Scientific and Technical Programs
- Regulations of Financing Scientific, Technical and Innovative Activity at the Expense of the Republican Budget
- Regulations of Organisation and Realisation of State (Independent) Scientific and Technical Examination of the Projects on Research and Design
- Concept on Reforming Science in the Kyrgyz Republic for the years1999 – 2005"
- Regulations of Elections of the Chiefs of the Research Institutions
- Regulations of Research Institutions

The role of the state in this field is the creation of favourable conditions for the implementation of scientific projects, development of research, and utilisation of state-of-the-art technologies. To achieve these goals the following methods can be used:

- attraction of investments;
- favorable tax policy;
- legal support for innovative solutions;
- provision of state financial support; and
- development of the banking system and financial market for high-tech industry.

Priority directions for science and technology are determined by the economic situation in the country; global tendencies in science and technology; availability of raw materials; and market demand. Currently major priority directions are:

- health and environment;
- agriculture and consumer products;
- electric power production;
- development of mountainous regions;

- mineral and water resources;
- information and telecommunication technologies;
- new materials, construction;
- development of tourism; and
- fundamental research.

Key directions in the field of Information and Telecommunication technologies are as follows:

- optical electronic components and their usage in communications and computers
- high density memory
- fiber optical networks
- information technologies and Internet in education

The Kyrgyz Republic's economy is in transition stage and has very few opportunities to invest in science and technology. As such, the country relies on international community grants and programmes. Significant results have been achieved via research co-operation with foreign countries, and an agreement has been signed between the Kyrgyz Republic and the International Association on Co-operation with Newly Independent States (INTAS).

Kyrgyzstan is a landlocked state located on the crossroads between Asia and Europe and 90 % of its territory is covered with mountains. There are many earth metal deposits in the country and over the last two centuries a mining industry has developed.

The semiconductor production process requires heavy usage of electric power. The Kyrgyz Republic has, in fact, excellent natural conditions for producing hydro electricity and, before the break-up of the Soviet Union, a series of hydro electric plants were built in the country which also exported hydro electricity to neighboring States.

At this time, the semiconductor production industry was successfully functioning and there were several high- tech equipment manufacturing plants oriented towards the military sector. With the collapse of the Soviet Union, however, there is no demand for these products and the entire sector has ceased to function.

The country, which has great potential for a semiconductor industry - raw materials, inexpensive hydro energy, and qualified personnel – needs investment opportunities. At the same time, investors from South Korea are expressing interest in the semiconductor industry in the Kyrgyz Republic.

Kyrgyzstan has the most liberal regime of the Central Asian States. The Internet with its highly democratic principles are implemented into algorithms of the network operations and are sensitive to any restrictions in network access and management. This country has the most favorable conditions for development of network software applications and access to online informational resources and it can serve as a hub for the entire Central Asian region for information and telecommunication initiatives.

The development of international transport corridors such as Traceka and the Silk Road, which pass through the territory of the Kyrgyz Republic, will stimulate a demand for all types of IT services to facilitate day-to-day operations of transport routes.

5.1 Development of ICT in different sectors

5.1.1 Legislation

For sufficient development of ICTs, the following decrees should be adopted:

- About Internet
- Information security
- Electronic documents
- Electronic payment
- Digital signatures
- Electronic stamps
- Information resources
- Insurance of information risks
- Personal data protection.

In view of the rapid development of IT, the process of legislation should be accelerated.

5.1.2 Electronic government

Electronic government is the system of interactive communications between citizens and the state. It is necessary to create centres providing information and communication services.

5.1.3 Development of electronic entrepreneurship

The following factors are essential for the development of electronic commerce:

- an increase in the population's wealth and an improvement in the market. For buyers, an ability to pay for goods, and for sellers, an ability to pay for the creation and maintenance of electronic commerce systems;
- an increase in the number of Internet users;
- promotion of Internet in the society;
- creation of reliable national electronic payment systems that provide access to financial information (bank accounts, credit cards etc.) through the Internet;
- organization of courier delivery services with possibilities to pay in cash;
- elimination of psychological barriers in shopping online through marketing and advertisement activities;
- creation of a legal basis. Security is one of the most important issues in electronic commerce; and
- training of specialists.

5.1.4 ICT development in the educational sector

High school system

- improve the quality of training (including upgrading of knowledge) of teachers of informatics at high schools; foresee targeted financing from all sources (state and local budgets, budgets of educational institutions, loans, grants, sponsorship, etc.) for implementation and development of ICT in the educational sector;

- conclude establishment of distance training of high school teachers; create a national educational network with ISP functions;
- develop new educational programmes, methods and technologies of teaching «informatics» in high school, and related subjects in high and medium professional institutions, including the most recent achievements in this sphere;
- 100% computerization of high schools in Kyrgyzstan, less than 50% of them with modern computer classes; medium ratio of not more than 100 students per one computer in high schools; access to Internet of not less than 10% of high schools of Kyrgyzstan.

Higher educational institutions

- improve quality and quantity of IT specialists' training in design and development of software for information systems;
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- activate the creation of e-libraries with access to the Internet and world information resources in educational and scientific institutions;
- expandthe National Research and Educational Network (NREN) by connecting universities in southern Bishkek and regional universities to Internet through dedicated channels. Develop distance learning by using modern educational and telecommunication technologies, providing high quality multimedia materials;
- establish a National Center of Information Technologies equipped with the most modern technology to develop human resources and train high quality specialists in ICT. The National IT Center would host different training courses, incubate IT investigation projects, create a database and assist in the promotion of e-commerce and other businesses with network use.
- equip all higher institutions with modern computer technologies and fully integrate ICT into the educational process; achieve an average ratio in all higher institutions of not more than 20 students per computer; wider usage of Internet by all higher institutions (mainly through dedicated channels)

5.1.5 Programmes in the healthcare system

The healthcare information system development concept, and the telemedicine development concept for the years 2001 to 2005 provid the basis for the following programmes:

Tele-education:
- distance training;
- promotion of a healthy life style.

Telemedicine, providing distant healthcare services:
- use of ICT for information exchange on diagnostics, treatment and improvement of qualification of employees.

Telematics for research in healthcare:
- cooperation between specialists and centres for the exchange of ideas, research results and access to sources of information and knowledge;
- development of telematics technologies and applications.

Telematics for management in healthcare:
- use of ICTs for the control of diseases;

- evaluation of the quality, amount and efficiency of healthcare services

Funding

A significant part of the programme should be implemented through attracted investments. For the projects on improvement and development of the state policy and its legal and normative bases, funding will be allocated from state and local budgets as well as from budgets of state agencies. It may also attract foreign investments and grants of international organizations.

The programme's financial scheme plans to attract domestic commercial structures to the funding of profitable projects. Projects proposed and financed by commercial structures can be included into the Program.

The amount of funding required for the first stage of the programme will be determined after projects are chosen for implementation.

Projects of the program will be implemented based on tender and selection of the projects will be based on independent expertise. Expert groups will be composed of outstanding scientists and IT specialists.

6. National major initiatives

There are several major directions in which state institutions are actively involved:

- development of the legal basis for the information society;
- liberalisation of the information and telecommunications market;
- encouragement of competition: de-monopolisation and privatisation;
- provision of technical support for human rights via access to informational resources;
- state guarantee to citizens on information and telecommunication services (mobile telephones, satellite communications, Internet, e-mail, multi-media, distance learning, telemedicine);
- improvement of state management in the ICT field.

The Ministry of Transport and Communications, the State Communications Agency and communication operators are jointly developing three programmes:

- State programme on the development of communications in rural areas;
- regional informatisation programme "Internet for villages";
- development of regional TV and radio broadcasting.

Technological modernisation of telecommunications is proceeding as follows:

- Digital automatic exchange stations
- Digital data transfer technologies
- Fiber optical lines
- Satellite communications.

The international SilkSat project is based on the use of satellite communications along the ancient Silk Road and is important for regional cooperation. In terms of this project, a Commission under the President and Satellite Technologies Center has been created.

70 % of the Kyrgyz territory consists of mountainous regions. In such conditions, instead of laying cables, it is more efficient to use terrestrial satellite technologies VSAT. A cost-efficient approach to the placing of a small satellite in orbit is available through Russian rocket launches.

Kyrgyzstan is actively involved in numerous international agreements on the development of information exchange within CIS and regional cooperation in communications.

Some of the major state initiatives include:

- President's Decree "About legal concept for informatization in the Kyrgyz Republic", 17 October 1997;
- Concept on informatization development in the Kyrgyz Republic, signed by President of the Kyrgyz Republic, 14 February 1998;
- Decree of the Government of the Kyrgyz Republic "About creation and use of tax and insurance payers common database", 25 February1999;
- President's Decree "About creation and development of the State Computer Network and State Automatic System "Shailoo", 26 March 1999;
- President's Decree «About creation of the State Computer Network based on Information

Management System and State Automatic System "Shailoo", 3 May 2001;

- Kyrgyz Government Decree "About regulation of mutual use by state institutions of the State Computer Network", 23 July 2001
- Decree of the President of the Kyrgyz Republic on the National Strategy 'Information and Communication Technologies for Development in the Kyrgyz Republic', 10 March 2002

Conclusion

Strategically, Kyrgyzstan has few natural resources that can be used to spur overall economic development. However, it has an educated work force (literacy rate of 97 %), including a sizeable number of qualified computer specialists and programmers. The country has potential in some industries, such as hydro-electricity, tourism and water management. These industries require sophisticated information processing (management of electricity and water supply, promotion of tourism services over Internet, i.e., B2C systems).

Kyrgyzstan is located on prospective intercontinental crossroads. The development of TRACEKA and the SilkRoad transport projects will require all types of telecommunication services to serve the day-to-day operations of transport corridors.

While most traditional industries require a high level of investment, currently difficult or impossible for Kyrgyzstan, information technologies require relatively low initial investment.

For a developing country, the most effective way to develop national ICT capabilities is to concentrate on initiatives that leverage the state's limited resources to create the preconditions and favorable environment for private business development in ICT. The goal of the National ICT Strategy is to create appropriate conditions for the development of the IT sector of the economy, and to provide a basis for fast growth of private services in IT.

Annex I - Benchmarking

Table 1

Stage	Information infrastructure	Internet availability	Internet affordability
Stage 1			
Stage 2	A small minority in the community has good access to the telecommunications network, but most of the community does not. (Roughly: Teledensity is between two and eight mainlines per 100 people. Mobile wireless penetration is between 0.5 % and 3 %. Cable penetration is below 5 % of all household in the community)	.	Rates for local telephone calls are high enough to discourage extensive Internet use via local ISPs, even among those, who could afford Internet access. Local access solutions exist, but rates for ISP services are high enough to discourage extensive use. The lack of competition in the provision of commercial leased lines is reflected in prohibitively or very high leasing fees**.**
Stage 3		There are between 0.5 and one million inhabitants per local ISP. ISPs provide full Internet access. Subscribers may have some options between various Internet service packages. There are some opportunities for public Internet access. It is normally possible for users to establish a dial-up connection to a local ISP, except during peak hours. One or two private providers lease lines to businesses.	

Table 2

Stage	Network speed and quality	Hardware and software	Service and support
Stage 1			
Stage 2		Some off-the shelf hardware and software solutions are available locally, but there are none or very few in the native language of the community. Basic hardware and software is affordable for some citizens and small and medium-sized businesses.	
Stage 3	70-90 % of domestic telephone calls are successful. Connections are dropped with noticeable frequency and are somewhat disruptive. Fewer than 50 faults are reported per year for 100 mainlines. Users have access to dial-up modem transfer speeds of up to 28.8 Kbps. Leased lines with transfer speeds of up to 64 Kbps are widely available for businesses and ISPs. Limited higher-speed lines are available in some areas. Backbone facilities servicing the community are usually sufficient, although regular peak demand periods result in slower network response times. Packets loss by the network may occur but it is not generally disruptive.		Mainlines take at least one month to be installed. It takes over a week for reported mainline problem to be resolved. There is a growing customer service ethic among service and support providers, although it is not a priority for most. Some ICT maintenance and technical support services are available. A nascent software industry is present in the community, and there are a growing number of hardware technicians, web designers and network administrators.

Table 3

Stage	Schools' access to ICTs	Enhancing education with ICTs	Developing the ICT workforce
Stage 1			
Stage 2	Where there are ICTs in schools, it is primarily at university level, and there are generally fewer than five computers in a school or faculty. Access to the computer(s) is limited to computer teachers and/or administrators. Computers tend to be older generation models, such as stand-alone 486 PCs or the equivalent. Where there are multiple computers installed, they are not networked. Use of the computer(s) is limited to electronic documents that are available on the hard drive or diskettes. There may be connectivity for store-and-forward e-mail.	Only a few teachers use computers in a very limited fashion. Teachers' basic computer literacy involves skills such as use of the keyboard and mouse, a basic understanding of the computer operating system, manipulation of files, and cutting and pasting. Computers are mainly used at the university level.	
Stage 3			Technical classes and programs on ICT-related subjects are available from a variety of public and private centres. Some limited online access to training is available. Some employers offer training in the use of information and communication technologies to their employees.

Table 4

Stage	People and organisations online	Locally relevant content	ICTS in everyday life	ICTs in the work-place
Stage 1				
Stage 2	Much of the population has never heard of the Internet, and most people do not know anyone who has used it. Less than 0.5% of the population has used the Internet recently, and few are regular users. Some local businesses and institutions have registered domain names - fewer than two per 1000 inhabitants. No advertising in traditional media for online companies or resources exists.			

Stage 3		Some local websites are available – most are static and updated infrequently. Websites carry diverse types of information for different community groups. Many websites are available in local languages or a dominant Web language spoken locally. There is some use of online bulletin-board systems, Usenet groups, newsletters, and/or listservs. Web-related training opportunities exist although can be expensive and accessible only in certain areas.	Public telephones may be found in most parts of the community and are heavily used. Some members of the community have Internet access at home. Growing numbers of community members use telecenters, cyber-cafes and other businesses that offer computer use and online services to the public for a fee.	Organisations achieve efficiency gains through some degree of deployment of ICT systems in their internal workings. Many computers in business offices are internally networked for data processing, management reporting, and other enterprise applications. Some employees conduct research and business transactions over the Web, though most often they use a shared workstation to do so. Some employees use e-mail for internal communications.

Table 5

Stage	ICT employment opportunities	B2C electronic commerce	B2B electronic commerce	E-Government
Stage 1				
Stage 2				A few governmental websites exist, providing basic information, often directed at parties outside of the community. This information is static and infrequently updated. Some limited interaction with the government is possible by phone or fax. The government distributes some information about services, procedures, rights and responsibilities in hard copy.
Stage 3	Technical skills in the community are becoming a source of competitive advantage and are beginning to attract investment and employment opportunities by companies from outside the community.	Many businesses post key information on websites. Information is often nor kept current and relevant. Websites provide information on goods and services for sale. Purchases take place primarily in person, or by fax or phone, though electronic mail may expedite the process. Some businesses may have introduced online ordering.	The deployment of electronic systems has increased efficiency and transparency and lowered transaction costs in B2B interactions. Some B2B transactions are supported by electronic systems (e.g. proprietary systems and databases), but some paper-based transactions (e.g. a signature) is usually required at some point. Electronic B2B transactions are a small percentage of overall B2B commerce.	

Table 6

Stage	Telecommunications regulation	ICT trade policy
Stage 1		
Stage 2		Trade barriers for ICT equipment have been reduced, but are still relatively high. There has been some opening in service sectors related to electronic commerce and ICT networks. Foreign direct investment is allowed in network sectors under certain conditions.
Stage 3	Plans for the liberalisation of the telecommunications sector are in place and are being implemented. Progress is being made in achieving universal access, but there are many hurdles in implementation. Services such as data, paging and mobile telephony are available from competing private providers. Alternative carriers compete for private network services, leased lines and other telecommunications services for businesses. Incumbent provider networks are being opened to competition through interconnection and/or unbundling obligations.	

Annex II – Knowledge-Based Economy Indicators

Network Access

1.1. Information infrastructure

- Telephone penetration (number of mainlines per 100 people)
  City – 27.6; Countryside – 4.12; Average – 7.8
- Mobile wireless penetration (%), growth trend
  Penetration - 0.5 %; growth trend 100 %
- Total number of mobile telephone subscribers
  17,000 (7,000 D-AMPS, 10,000 GSM)
- Total number of mobile telephone subscribers per 1000 people
  Four
- Wireless penetration (percentage of the population)
  0.4 %
- Growth trend
  2.8 % (telephone lines)
- Total number of cable TV subscribers
  13753 (April, 2002)
- Cable TV subscribers, % of households
  12.9 %

1.2. Internet availability

- Total number of ISP providers
  12
- Prevailing types of ISPs' networks (microwaves/radio…)
  Most ISPs provide services through the existing public telephone network in the form of dial-up and dedicated connections. There are a few opportunities for digital data transfer services through radio connections (radio Ethernet) and provided by local ISPs.
- % of unsuccessful local calls
  26 %
- Is there competition among ISP providers?
  There is a strong competition among ISPs.
- What are opportunities for public Internet access (libraries, Internet-cafes, etc.)?
  There are numerous Internet - cafes, UNDP Resource Centers, NGO Resource Centers.
- Are there dedicated line lease possibilities? Are there competing providers?
  Yes, there are different options for dedicated line leasing.

1.3. Internet affordability

- What are the prices of Internet access (unlimited access, per minute charge)?
  $ *50/month - unlimited, $ 0.01/minute*
- Is it affordable for majority/minority (compare with average salary/income)?
  The prices of Internet access are not affordable for the majority of the population.
- What are the rates for leasing lines?
  32 Kbps - 500 U.S.D./month
- Are the rates affordable for small businesses or individuals?
  The rates are not affordable for small businesses and individuals.

1.4. Network speed and quality

- What is the percentage of successful calls?
  74 %
- What is the quality of voice connection?
  The quality of voice connection is acceptable across the country, except for in remote rural areas.
- How many faults are reported per year for each 100 telephone mainlines?
  8
- How long it takes to clear faults (48 hours, a week, month)?
  6 hours
- Which services are supported by local telecommunications infrastructure: e-mail, high-speed modem connection, what is the maximum speed?
  e-mail services, DSL modems with 7 Mbps speed
- Are there sufficient backbone facilities/networks? Even for peak demand?

Satellite Communications		
1.	NATO NREN	2.5 Mbps
2.	Kyrgyztelecom	2Mbps
3.	I.S.P. Elcat	2Mbps
4.	I.S.P. Asia-Info	2Mbps
5.	I.S.P. Transfer	2Mbps
Fiber Optical line		
6.	Trans Eurasia optical line (not in operation yet)	622 Mbps

Majority of end users are using existing telephone networks for data transfer needs. During peak demands bottlenecks appear between ATS nodes.

- What is the percentage of packet loss by the network?
  1 –1.5 %

1.5. Hardware and software

- Are there local IT hardware/software sales points?
  There are about 25 hardware sales points.
- Is the price of IT hardware/software affordable for majority/minority of citizens/businesses?

The price of IT hardware/software is not affordable for the majority of citizens and businesses.

- Is there software in local languages?
  *Yes, there are software applications available in local lang*uages.
- Is software imported or adapted locally? (percentage of the imported, adapted, produced locally hardware or software in total number in circulation)

#	Sector	Imported, %	Adopted, %	Produced, %
1.	Telecommunications	90	7	3
2.	Economics	20	10	70
3.	Social sector	40	60	-
4.	Post office	20	80	-
5.	Rail roads	40	60	-
6.	Tourism	80	20	-
7.	State Computer Network	50	50	-
8.	Law enforcement agencies	-	-	100
	TOTAL	42.5	35.9	21.6

- Is there a broad variety/some/very few software business applications?
  There are business software applications (accounting, bookkeeping, databases, client/server online applications) in use.
- Are the IT software/hardware retail and wholesale markets competitive and vibrant?
  IT software/hardware retail and wholesale markets are competitive and vibrant.

1.6. Service and support

- How long is the waiting period for telephone line installment? (total number of those on the waiting list; waiting period: days, weeks, months, years)
  Waiting list is 37,666 (City – 31,447, Countryside – 6,219), waiting period – from 1 month up to 1 year.
- How long is the waiting period for reported telephone line problem to be fixed? (minutes, hours, days and etc.)
  6 hours.
- Are there software developers, web designers, network administrators and other technical personnel, and how many (working where, employed/unemployed)?

1.	State employed programmers & network administrators	672
2.	Number of programmers & network administrators	1170
3.	State employed IT specialists	3796
4.	Total number of IT specialists	9502

Year 2001

2. Networked Learning

2.1. Schools' access to ICTs

- Are there computers in schools? How many students per computer? On which level (university/secondary/primary)?
  University – 37 students per computer
  High school – 330 students per computer

Primary – N/A

Number of schools	1 980
Number of computers in schools	3 119
Number of schools with computer labs	308
Number of computers per school	1.575
Number of students	1 025 792
Students per computer	330
% of schools with computer labs	15.556 %

- Who has access to computers (technical staff/faculty/students)?
  Technical staff, faculty, students have access to computers.
- What is the quality of hardware (386/486/Pentium…)?
  IBM compatible 486 and higher.
- Are there LANs in schools? Regional WANs? National school networks?
  There are about 30 LANs in high schools. There are no regional WANs and national school networks.
- Do schools have Internet connectivity? Is it dial up or through a leased line, wireless?
  About 30 schools have Internet access. Most of them have dial up access.

2.2. Enhancing education with ICTs

- What is the percentage of students and teachers using computers? (in universities/primary schools/high schools)
  Primary schools – N/A ; High schools – 15 % ; Universities – 88 %
- What are the computers used for? What is the level of computer literacy/skills?
  Computers are mostly used for word processing, use of spreadsheets primitive graphics in high schools. At universities they are used a lot for online applications, databases and some programming. In general, the level of computer literacy is moderate in higher educational institutions.
- What is the level of information and communication technologies integration in the curriculum?
  The level of integration of ICTs in the curriculum is not sufficient and it should be revised.

2.3. Developing the ICT workforce

- Are there training opportunities for programming, maintenance, and support?
  Yes*, there are training opportunities for programming, maintenance, and support.*
- Who is offering them (public/private centers)?
  Private and public centers are offering them.
- Are they affordable for majority/minority of the population?
  They are affordable for a minority of the population.
- Is there an on-line training available?
  Limited on-line training is available.
- Do employers offer training?
  Employers usually offer limited training.

3. Networked Society

3.1. People and organization online

- What is the percentage of the population:
    - Is aware of Internet existence? – *26.8 %*
    - Has used Internet recently? - *10.6 %*
    - Uses Internet regularly? - *9.6 %*

  The survey was conducted among the adult population of big cities.

- What is the structure of users by gender, age, social and educational status?
  Gender: male – 56.25 %; female – 43.75 %
  Age: 15-17 years – 0.83%; 18 – 22 years – 19.17%; 23-27 years – 44.17%; 28-35 years – 25%; 36-45 years – 7.51%; more than 46 years – 3.33%
  Status: executive staff – 19.17%; software developer – 11.67 %; mid level manager – 33.33%; intern – 7.5%; other – 34.17%; not mentioned – 4.17%
- What is the number locally registered domain names (per 1000 people)?
  0.2
- Is there advertising for online companies, and how common is it?
  There is some advertising for online companies but it's not common.

3.2. Locally relevant content

- Are there (and how many: no, few, some, many) websites:
  There are about 500 web sites providing local topics in local languages.
- How often are they updated and is content static or dynamic?
  A few web sites are updated on a daily basis. There are some dynamic web sites with client side and server side data processing as well as remote database access.
- Are the above websites created in the community?
  Yes, these web sites are created by local programmers.
- Are bulletin board systems, Usenet groups, newsletters, and/or listservs in use?
  There are several popular bulletin board systems with sections like: "For Sale", "Help Wanted" and so on. Several newsletters are distributed on a regular basis.
- Are there opportunities for Web-related training?
  There are paid and free of charge opportunities for Web-related training. Colleges and training centers are providing such training at a reasonable price. Resources Centres are supported by the International Development Agencies, which are also providing Web – related training free of charge for NGOs and the general public.

3.3. ICTs in every-day-life

- Does population include information and communication technologies (phones, faxes, pagers, computers) in everyday life?
  A sizeable portion of the population is using ICTs in everyday life.
- Are there phones, wireless phones, digital assistants, pagers, PCs and are they being used regularly? Are they used for household commerce (banking, online shopping, investing) and social and commercial interaction (bartering, online chat and etc.)
  They are widely used but not for household commerce, mostly for communication.
- Are there PCs with e-mail capability available (cyber cafés, telecenters)

and are they being widely used?
There are 113 public access points;
22 people per 1000 use a free-of-charge access to Internet, annually.

3.4. ICTs in the workplace

- Do employees have:
  - (Un)limited access to phones?
    Usually, employees have unlimited access to phones.
  - Personal e-mail accounts?
    Use of e-mail accounts is becoming common among the younger generation of employees.
  - Internet access from personal workstations?
    Exists for a limited number of employees.
  - E-mail and web addresses on business cards?
    E-mails are widely used on business cards, while Web presence is not so common.

- What percentage of businesses and government offices has computers, how many of them, how many employees use them?
  17.4 %
  Number of state owned computers – *12085*
  Total number of computers - *25953*
- Are they networked?
  10 % of government offices, mid-sized and bigger businesses use LANs. 6.3 % of state agencies are connected to the State Computer Network.
- Is business mostly conducted in person or by e-mail, or are there data sharing, enterprise, reporting, transaction, and research applications? How intensively are they used?
  It depends on business; in the banking sector, foreign currency auctions are conducted online on a weekly basis and online transactions are made between commercial banks and the National Bank. The majority of business issues are conducted in person.
- Are there efficiency gains resulting from the use of ICT systems?
  In some fields, especially in tourism, there are sizeable gains from the use of ICT systems.

4. Networked Economy

4.1. ICT employment opportunities

- Are there opportunities for technically skilled workers within the country?
  Yes, there are employment opportunities for technically skilled workers within the country.
- Are companies from outside of the country investing in IT related projects?
  There are numerous joint ventures in the field of ICT with financial contributions from the Russian Federation, USA, Kazakhstan, Germany, Finland, Norway and other countries.
- What is the portion of knowledge workers and information related business in the economy? (percentage of labor force, percentage of GDP)?
  ICT companies – 0.7 %

ICT goods and services – 2.7 %

Percentage of research funding relatively to GDP

	1990	1991	1995	1996	1997	1998	1999	2000
Research, %	0.7	0.33	0.22	0.3	0.33	0.21	0.2	0.21

- Are businesses considering IT in their strategies?
  Businesses consider IT in their strategies. 17.4 % use ICTs.

4.2. B2C electronic commerce

- Do local businesses have websites and how many? Is content current or static?
  There are about 200 web sites. The content is moderately updated.
- Are there online B2C transactions, or are transactions mainly oral and/or paper-based, phone or fix-based?
  There are 44 online payment terminals and 87 international card services.
- Is online retail noticeable component of the overall commercial activity?
- *Plastic card payments are 26.7 % of overall no cash payments.*

4.3. B2B electronic commerce

- What are the sources of market information are they sufficient for providing transparency?
  Independent surveys, reports, statistics. Yes, they provide transparency.
- Are there online B2B transactions, or are transactions mainly oral, paper-based, phone or fax-based?
  There are online B2B transactions mostly in the banking sector.
- Can transactions be conducted online without any paper documents? Is the process automated? Does it allow online tracking, monitoring?
  Yes.
- What portion of B2B activity is conducted on line? Is there gain in efficiency?
  Mostly in the banking sector, for online foreign currency auctions.
  31 % of local banks use international card payment systems;
  39 % of local banks use a Client – Bank system.

4.4. E-Government

- Number of government resources online? Does it include information, hours of operation, any services? Is information current and relevant? –
  57.7 % of government agencies have own web sites. They provide basic information like hours of operation, services and, usually, it is current and relevant.
  1.4 % of the agencies maintain mailing lists
  17 % of services are provided online
- Is there online interaction between government and citizens, or is interaction mainly oral, paper-based, phone or fax-based?
  There are not many online interactions between government and citizens.
  2.0 % of legal drafts are available online
- Is there online interaction between government and suppliers and contractors, or is the interaction mainly oral, paper-based, phone or fax-based?
  2.0% of state budget and expenses are available online
  3.0 % online info on state procurement, sales, credits and so on.

Government offices communicate with suppliers and contractors mostly by e-mail, fax and phone.

- Is it possible to download applications from the websites?
  A few.
- Can citizens apply for permits, licenses, and taxes on line?
  A few.

5. Network Policy

5.1. Telecommunications regulation

- Is liberalization of telecommunications sector planned or implemented?
  Liberalisation of the telecommunications sector is planned.
- Is there competition between telecommunications service providers?
  There is strong competition between telecommunications service providers.
- Is broadband Internet access offered?
  Broadband Internet access is offered by different ISPs.
- Is regulation set and enforced by an independent body?
  Regulation is set and enforced by governmental agency.

5.2. ICT trade policy

- Do tariffs or other restrictions (technical standards, domestic regulation, etc.) exist?
  The international phone market is a monopoly until 2003 (Kyrgyztelecom).
- Are there restrictions in the service (including information services) sector?
  No.
- Are there disproportional taxes on electronically delivered services?
  There are no disproportional taxes in this field.
- Is Foreign Direct Investment in IT sector existent, and is it encouraged, discouraged, restricted?
  Foreign Direct Investment in the IT sector is about 100 million U.S.D. and it is highly encouraged.

6. Media

6.1. Radio, TV and newspapers

- Number of Radio and TV stations, newspapers
  Radio stations – 17 ; TV stations – 11 ; Newspapers – 23

- The size of audience/circulation.

	Audience	May, 2001	November, 2001	April, 2002
1.	Radio	257 200	239 900	219 600
2.	TV	309 300	337 900	341 100
3.	Newspapers	-	-	342 700

6.2. Employment in the media

- Number of employees in the media

	Sector	Employment
1.	Radio & TV	1701
2.	Newspapers	1749
3.	Magazines	163
	TOTAL	3613

2001

- Trend: is the number increasing/decreasing?
  The number is slightly increasing.

7. Intellectual Capital

7.1. Patents

- What is the number issued per annum?

	1993	1994	1995	1996	1997	1998	1999	2000	2001	Total
Patents	6	39	85	69	36	25	24	43	16	343
Preliminary patents	2	46	52	56	97	66	69	61	44	493

- What are the trends?
  The number has stabilized and has a tendency to grow.

7.2. Copyrights

- What is the number issued per annum?
  Total – 996 (April, 2002)
- What are the trends?
  Increasing

7.3. Licenses

- What is the number issued per annum?
  Total – 439 (April, 2002)
- What are the trends?
  Increasing.

7.4. Trademarks

- What is the number issued per annum?

	1993	1994	1995	1996	1997	1998	1999	2000	2001	Total
Trademarks, State Registry	6	2029	685	1075	356	489	612	433	295	5980

- What are the trends?
  Increasing

7.5. Scientific and/or tech associations

- List with a brief profile

#	Title	Date of registration	Profile	Phone	Chief
1.	"Union of educational institutions" Association	12.04.99	Association of legal bodies for excellence in education and support of teaching staff.	(3312) 996 42-23-27	Ibraimov Ramil
2.	Association of Employees of technical colleges	19.12.00	To present interests of staff in the secondary technical education field.	(3312) 996 54-00-36	Kasendeev Ilyas
3.	Association of the medical research and educational institutions	01.06.01	To enhance research and teaching in the medical field.	(3312) 996 212357	Uzakov Orosaly
4.	Union of employees of the research and educational institutions	02.10.01	To defend the interests of employees in the academic sector	(3312) 996 215547	Sultanbaeva Gulsha
5.	National Research and Educational Network (NREN) Aknet	24.01.02	To provide research and educational institutions with networking facilities and Internet access. Financial support from the NATO Science Program.	(3312) 996 221385	Kutanov Askar
6.	Association of researches in humanitarian sciences	20.08.99	To enhance research in the field of humanitarian sciences.	(3312) 996 24-70-76	Mamytova Elmira

7.	Association of the Internet Service Providers	2001	To defend the interests of the telecommunication operators, improvement of legislation and regulative norms in the sector. Financial support from the G.I.P.I., USAID	(3312) 996 661726	Jerebko Oleg

8. Education

8.1. Higher education

- Total number of high education establishments (public/private)
  1980
- Total number of students (total average per annum, in the private and in the public sector)
  1,025,792
- Prevailing specialisations. (distribution of students among the fields)
  N/A
- Cumulative number of population with higher education degrees (total and in science and technology fields)

  3,548

8.2. Distance learning

- Distant learning facilities.
  Three Universities provide partial distant education:
  - *International University of Kyrgyzstan – 150 students*
  - *National University of Kyrgyzstan – 120 students*
  - *Kyrgyz Technical Univiversity – 80 students*

- Number of students trained per center
  N/A

9. Labor Force

9.1. Employment in science and technical fields

- Number of employees and trends in the fields

Employment in Science and Research

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Employees, thousands	24.8	17.8	13.9	10.9	8.5	6.9	6.9	6.3	5.9	5.4	5.8
Percentage	1.4	1.0	0.8	0.6	0.5	0.4	0.4	0.4	0.3	0.3	0.3
Total Employment	1747.9	1754.1	1835.9	1680.6	1645.4	1641.7	1651.5	1689.3	1704.9	1764.3	1767.1

Most of scientific institutions are located in the capital Bishkek and the regional center Osh.

- Compensation rates in the fields (average salaries)

	Average Salary, %	Science and Research	Industry	Government	Banking	Informatics
1996	100	112.1	150.3	141.0	189.5	137.6
1997	100	122.3	156.6	139.5	294.5	168.5
1998	100	121.6	168.8	131.1	302.0	142.7
1999	100	106.2	193.5	115.9	294.4	131.3
2000	100	97.7	169.5	134.0	343.7	143.5

9.2. Employment in electronics industry *N/A*

- Number of employees and trends in the fields
- Compensation rates and trends in the fields

9.3. Employment in telecom industry

- Number of employees and trends in the fields
  10,270
- Compensation rates and trends in the fields
  295 % of average salary. Industry is growing.

10. Research and Development

10.1. Research institutions

- Number of research institutions

	1991	1992	1993	1994	1995	1996	1998	1999	2000
Bodies of Ministries	-	-	-	-	-	-	11	12	15
Academy of Science	-	-	-	25	15	21	21	25	25
Educational Institutions	4	6	12	12	16	15	13	14	14
Research under HEI	35	37	38	-	21	-	4	6	6
Research Institutes	-	-	-	26	-	-	9	12	10
Industrial Science	18	18	15	11	15	31	10	10	10
Others	9	8	9	3	9	9	12	9	9
TOTAL	66	69	74	77	76	76	81	89	90

10.2. Investments in research and development

- The total amount

Science and Technology funds distribution, %

Source of financing	1996	1997	1998	1999	2000
State Budget	54.1	63.2	62.2	49.2	41.7
Funds on research in educational sector	1.0	3.5	4.0	4.0	2.0
Non-budget funds	7.0	1.1	0.8	0.5	0.3
Own funds	4.1	3.4	3.6	4.9	4.5
Customer service	32.4	20.3	13.5	24.5	18.8
Foreign sources	1.4	8.5	15.9	16.9	32.7

- Government and private business breakdown of total investment in research and development
  Investment on ICT in companies is 0.02 %

11. Other issues

National initiatives regarding science and technology policy, venture capital, stimuli for students, scientists, etc.

Legislation in research and science comprises the following decrees:

- Law of the Kyrgyz Republic "About Science and Basics of the State Scientific and Technical Policy"
- Law of the Kyrgyz Republic "About Innovative Activity"
- Regulations of the State Agency on Science and Intellectual Property under the Government of the Kyrgyz Republic
- Regulations on the realization of the State Scientific and Technical Programs
- Regulations on State Financing of the Scientific and Technical Research Activities
- Regulations on the State/Independent Evaluation of Projects in Science and Technology
- Concepts of Reforms in Science and Technology in 1999-2005 in the Kyrgyz Republic
- Charters of scientific institutions in the Kyrgyz Republic

Major initiatives in the field of education are the following:

- State Program "Bilim"
- "Human Resources of the 21st Century"
- Doctrine of education 2001.

Annex III - Bibliography

1. First National ICT Summit 2001, Proceedings 2001 Bishkek
2. A. Kutanov, Prof. Academy of Management, "Human Resource Development in ICT", Bishkek 2002
3. U. Brimkulov, Prof. Kyrgyz Tech. Univ., "Human Resource Development in ICT", Bishkek 2002
4. A. Semenov, Booz&Allen Hamilton, "Digital Divide and Kyrgyzstan : Strategy for Development", February 2001 Bishkek
5. J. Dempsey, Invited Expert, Center for Democracy and Technology, "Legal Framework for Internet Development", February 2001 Bishkek
6. Decree #54, "National ICT Strategy for the Kyrgyz Republic", March 2002 Bishkek
7. Decree #248, "State Action Plan for ICT development in the Kyrgyz Republic", April 2002 Bishkek
8. ICT Council under the President of the Kyrgyz Republic, Recommendations Bishkek 2001
9. K. Talypov, Ministry of Transport and Communications, "ICT Development Program", Bishkek 2002
10. A. Dudin, Ch. Saadanbekov, ISP ElCat, "Internet in Kyrgyzstan"
11. Kyrgyzpatent, Report "State of the Science in the Kyrgyz Republic, 1991-2000"
12. M-Vector Research & Marketing Consultants, "Internet Auditorium in Kyrgyzstan", Bishkek 2001
13. M-Vector Research & Marketing Consultants, "Mass – Media in Kyrgyzstan", Bishkek 2001
14. R. Shayhutdinov, "Internet usage in Kyrgyzstan", Bishkek 2001
15. Data from National Statistics Committee, Bishkek 2002
16. Materials of Association of ISPs, Bishkek 2002