Economic Cooperation Organization

Joint ECO - ITU Study on ICT needs of ECO Member States

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ECONOMIC COOPERATION ORGANIZATION (ECO)

INTERNATIONAL TELECOMMUNICATION UNION (ITU)
TELECOMMUNICATION DEVELOPMENT BUREAU

Feasibility Study

to identify the needs for development of ICT and Telecommunication infrastructure connectivity, policy and regulation regimes and ICT services in the ECO Member States

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Executive summary

The objective of this feasibility study is to focus on reviewing the existing situation of telecommunication and ICT sector focusing more on the ICT infrastructures and associated services in the 10 ECO Member States (Afghanistan, Azerbaijan, Iran, Pakistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkey, Turkmenistan and Uzbekistan) at national and regional level comparing it with the global level. It also identifies the specific needs of the Member States for the development of infrastructure connectivity and services.

The first chapter of the study presents the retrospective of the global policies and strategies on ICT development for building an inclusive information society. Among them is the Millennium Declaration, adopted in September 2000, establishing the MDGs, including 8 anti-poverty targets to be accomplished by 2015; WSIS Declaration of Principles and Geneva Plan of Action; the Connect 2020 Agenda and 2016-2019 Strategic Plan, adopted at the ITU 2014 Plenipotentiary Conference and oriented to build an inclusive information society by 2020. In September 2015 a new sustainable development agenda "Transforming our world: the 2030 Agenda for Sustainable Development was adopted by UN Member States which sets the global goals to end poverty, protect the planet, and ensure prosperity for all till 2030. Further regional and national strategies addressing policy priorities related to the digital economy are described. These include the 2010 Framework for Action on ICT for Development in the Pacific (FAIDP), Europe's Digital Agenda 2020, Britain's Superfast Broadband Future, Japan's strategy, Poland's national broadband strategy, Portugal's Agenda Portugal Digital, Luxembourg's Digital Lëtzebuerg and China's 2006-2020 National Informatization Development Strategy. The recent main trends in the ICT development are also described in the first chapter and include the transition to the Next Generation Networks (NGN), deployment of the New Generation Access Network (NGA) mainly based on fiber optics. Another trend is access to high and ultra-high broadband Internet, which can deliver telecommunications services, information societies services, broadcasting services and much more.

The second chapter describes the national policies and strategies for ICT sector and information society development approved by the ECO Member States. It contains the main goals and objectives of these polices and strategies, what is the vision of these countries to develop the ICT sector and make a transformation into an information society, what conditions and mechanisms are created for the promotion of the information society. The analysis of the polices and strategic documents of the ECO Member Stats showed that out of 10 ECO countries, seven established the broadband development targets in the sectorial policies and strategies. However no ECO country has a special strategy devoted to the broadband development.

Chapter three assesses the fixed and mobile telephony segments of the market, Internet access, fixed and mobile broadband deployment regarding the penetration rates and prices for these services. A comparison is also made of the ECO region averages with other regions and the whole world on the penetration rates. The ICT services prices on affordability for the end users are analyzed for all ECO Member States. In all countries of the ECO region fixed-line services are still dominated by incumbents, while mobile services are fiercely competitive. The fixed telephony market of the ECO Member States represents 53,858,569 subscribers in 2015 and accounted 13.61%. By the end of 2014 the mobile-cellular market counted 382, 928, 703 subscribers that represented a regional penetration rate of 104.948%. In 2014 the fixed (wired)-broadband market in the ECO Member States had 22,968,725 subscribers, with an annual growth of around 3,200,000 during the last three years and the regional penetration was 6.03%. The average of mobile broadband penetration in the ECO region reached 23%. The household access to the Internet was 27.38% by the end of 2013, which is lower than the world's average. The most connected to the Internet

are households in Kazakhstan (55.0%), followed by Azerbaijan (51.5%) and Turkey (49.1%). The 10 countries internal infrastructure development and inter- countries connections and regional access to the international canal are presented.

Further this chapter shows the development of the information society services in the ECO Member States and also the EGDI values and its tree components (online service, telecommunications infrastructure and human capital), their global ranks for 2012 and 2013, the level of development and the ECO regional EGDI average. For the purpose of comparing the levels of ICT development and analyzing the digital divide, the ICT Development Index (IDI) is presented for all ECO Member States, their global ranks for 2012 and 2013, the level of development and the ECO regional IDI average. From 2012 to 2013 the ECO Member States improved their IDI value and the regional IDI increased by 0.19 units representing 4.03. However, this is still the lowest of all regions after Africa.

In chapter four is assessed the "package" of the laws that governs the ICT sector of the ECO Member States. In the past decade the ECO Member States have made considerable efforts to create and improve the legal framework in the ICT field. The current period requires a legal framework oriented towards the development of the information society, such as Electronic Commerce Law, Electronic Signature Law, Data Protection Law, Electronic Document Law, Cybercrime Law. Currently the majority of the ECO countries are amending or revising the ICT legal framework. An overview of the relevant legislation on the telecommunications and information societies in the ECO Member States is provided in the study.

Chapter five describes the institutional framework in the ICT sector of the ECO Member States: the policy making authorities and independent regulatory agencies, their main duties and responsibilities. The institutional reform implies the process of separation of the roles of (1) policy making (government), (2) sector regulation (regulatory agencies) and (3) ownership and management (private sector). The key benefits from independent regulators are to shield specific economic sectors from short-term political interventions in order to ensure long-term market stability and economic objectives, and to avoid the influence and capture by particular interests, either by the entities being regulated or other non-governmental groups. As part of the liberalization process, many countries have established an independent regulatory authority. Five out of 10 ECO Member States have created independent regulatory authorities, while in the other five countries the regulatory functions are performed by the sectorial Ministry or other policy-makers. Five national regulatory authorities were assessed in the Study on their independence focusing on the institutional design, budgetary autonomy, staffing, reporting and transparency. The problems were identified and recommendations provided.

Chapter six has the aim to evaluate the regulatory framework of ECO Member States, especially access to the market, regulation of the limited resources, interconnection, access to the last mile and physical infrastructure sharing, protection of competition. Following the evaluation, recommendations were provided in order to eliminate the barriers to new entrants, ensuring the inclusion of competitive provisions that guarantee a healthy relationship between all authorized players in the relevant market (operators, Internet providers, OTT providers, etc) as way to promote the deployment of next-generation broadband networks and access to online applications and services.

Introduction

The Information Society and associated transformations play an increasingly important role in economies and societies in all countries. In order to maximize the potential of the digital economy for productivity, innovation, growth and jobs, governments need to do more than encourage broadband expansion, they must also engage in further and renewed efforts to protect competition, lower artificial barriers to entry, strengthen regulatory coherence, improve user skills, and build trust in essential infrastructures and applications.

Infrastructure – which provides a foundation for the digital economy, needs to be of high quality, accessible to all and available at competitive prices.

The ECO Member States have rightly recognized the importance of ICT deployment and adoption for increased economic growth and productivity. In this regard, the 1st Meeting of Ministers of the Information and Communication Technology of the ECO Member States (Tehran, 11-13 November 2012) decided that a Feasibility Study would be conducted to identify the needs for development of infrastructure connectivity and services in the ECO Member States.

The current assignment was commissioned and financed by ITU at the request of the ECO Secretariat. It envisaged preparing a feasibility study to identify the needs for development of ICT and Telecommunication infrastructure connectivity, policy and regulation regimes and ICT services in the ECO Member States.

This Study is devoted to promote the integration and cooperation among countries located in the ECO region. The Member States may benefit from infrastructure implementation, applying policies, regulations and financial strategies to maximize the advantages of ICT. It is focusing on reviewing existing situation of the telecommunication and ICT sector and ICT infrastructures and associated services in the ECO countries at national and regional level compared to the global level. After assessing the current situation, specific needs of the ECO Member States were identified for the development of infrastructure connectivity and services. That was prepared based on the questionnaire drafted and submitted through the ECO Secretariat to the 10 Focal Points in order to collect a general picture of the needs for development of infrastructure connectivity, policy and regulatory environment and services. However, only 5 filled in questionnaires were received by the expert. The missing information was collected from other reliable sources available online.

The study is expected to be presented at the 2nd ECO ICT Ministerial to be held in February 2016 in Tehran.

1. **Digital economy: policy and strategy for ICT development in the XXI century**

   1.1. **Information era goals: new strategies and trends in the ICT development in the world**

The Millennium Development Goals

The Millennium Declaration was adopted in September 2000 and includes commitments on development and poverty eradication, protecting the environment, human rights, democracy, good governance. Subsequently, a Road Map for implementing the Millennium Declaration was prepared covering eight Millennium Development Goals (MDGs), supported by 18 quantified and time-bound targets and 48

indicators. The MDGs were focusing on achieving significant, measurable improvements in people's lives by the year 2015.

WSIS vision and targets

Recognizing the urgent need to harness the potential of the Information Communication Technologies (ICTs) in order to support achieving the 8th MDG, UN established in 2003 the World Summit on the Information Society (WSIS).

The first two phases of the WSIS were held in Geneva, Switzerland (2003) and in Tunis, Tunisia (2005). In order to set a common vision for building an inclusive information society, the Summits gathered governments, private sector, civil society and international organizations from around the globe. In accordance with the MDGs, the Geneva phase agreed on a Declaration of Principles and a Plan of Action, with ten targets and several action lines to be achieved by 2015. In Tunis were approved the Tunis Commitment and Agenda, along with the establishment of the Internet Governance Forum (IGF). The Geneva Plan of Action promotes the use of ICTs for the achievement of internationally agreed development goals and targets. In order to be able to measure the achievements the WSIS targets were identified. With special attention to developing countries, the ten targets of the Plan of Action are the following:

Target 1. Connect all villages with ICTs and establish community access points;

Target 2. Connect all secondary schools and primary schools with ICTs;

Target 3. Connect all scientific and research centers with ICTs;

Target 4. Connect all public libraries, museums, post offices and national archives with ICTs;

Target 5. Connect all health centers and hospitals with ICTs;

Target 6. Connect all central government departments and establish websites;

Target 7. Adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances;

Target 8. Ensure that all of the world's population has access to television and radio services;

Target 9. Encourage the development of content and put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet;

Target 10. Ensure that more than half the world's inhabitants have access to ICTs within their reach and make use of them;

Additionally Target 11 was proposed: Connect all businesses with ICTs.

Annual WSIS Forums are an integral part to the follow-up of the WSIS, which define a set of targets, recommendations and commitments to build an inclusive, people-centric, and development-oriented Information Society.

The United Nations General Assembly in its resolution entitled "The Future We Want" has reaffirmed the strong need to achieve sustainable development by promoting sustained, inclusive and equitable economic growth, creating greater opportunities for all, reducing inequalities, raising basic standards of living, fostering equitable social development and inclusion and promoting the integrated and sustainable management of natural resources and ecosystems. It stressed that all levels of government and legislative bodies play an important role in promoting sustainable development.

The Millennium Development Goals Report 2015

The MDGs included 8 anti-poverty targets to be accomplished by 2015. Since then, substantial progress has been made towards achieving the MDGs.

The last **Millennium Development Goals Report 2015**[1] presents data and analysis of the achievements and progress made in many areas, including the ICT sector. During this period the information and communication technologies have completely transformed the way people live, work and communicate. Their role and importance continue to expand thanks to the technological progress, expanding networks, falling prices and growth in applications and content. According to the Report, the proportion of the population covered by a 2G mobile-cellular network grew from 58% in 2001 to 95% in 2015. The number of mobile-cellular subscriptions has grown almost tenfold in the last 15 years, from 738 million in 2000 to over 7 billion in 2015. Since 2002, the number of mobile-cellular subscriptions has exceeded the number of fixed telephone subscriptions. Internet penetration has grown from just over 6% of the world's population in 2000 to 43% in 2015. As a result, 3.2 billion people are linked to a global network of content and applications, including user generated content and social media. Rapid advances in fixed- and mobile-broadband technologies are continuously improving the type and quality of services available. Mobile broadband has overcome infrastructure challenges, enabling more areas to connect to the Internet. Its penetration rate increased fourfold between 2010 and 2015, reaching 47%.

Smart phones continue to become cheaper and more widespread. Their growing processing power supports the seamless delivery of services to an increasing number of people in every imaginable sector, including banking, retail trade, transport, health and education.

The digital divide is particularly pronounced with respect to Internet use and quality of access. For instance, just over one third of the population in developing countries uses the Internet, compared to 82 % in developed countries. The contrast is even more dramatic in sub-Saharan Africa, where less than 21% of the population uses the Internet, and in LDCs, where the figure is less than 10 %.

Internet bandwidth and national backbone capacities are important building blocks for providing affordable high-speed Internet access. They remain a major challenge in many lower-income countries, particularly small island and landlocked developing states. There are also major inequalities across countries in terms of costs of ICT services, availability of ICT skills and availability of relevant and local content. Also, while the global mobile-cellular penetration rate was 97 % by mid 2015, it reached only 64 % in LDCs. An estimated 450 million people living in rural areas still live out of reach of a mobile signal.

In September 2015 UN Member States adopted a set of global goals to end poverty, protect the planet, and ensure prosperity for all as part of a new sustainable development agenda: "Transforming our world:

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[1] United Nations "The Millennium Development Goals Report 2015"
http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf

the 2030 Agenda for Sustainable Development". The Agenda includes 17 Sustainable Development Goals and 169 targets. ICT, science and technology have been identified as key enablers of development. Direct references to the catalytic power of ICTs for development are cited as specific targets in four of the 17 goals (in targets related to education, gender empowerment, universal affordable access to ICTs/internet in LDCs and as a means of implementation):

- ✓ Goal 4: Ensure inclusive and equitable quality education and promote life-long learning opportunities for all;
- ✓ Goal 5: Achieve gender equality and empower all women and girls:
- ✓ Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

    - o By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean

    - o Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020

- ✓ Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development.

ICTs have an intrinsic value for long-term sustainable development beyond the four targets in the post-2015 development framework. The development of ICT infrastructures foster national capacity-building capabilities and regional integration, and create an enabling environment required to implement the new sustainable development agenda.

Connect 2020 Agenda

The Connect 2020 Agenda is a new global framework for collaboration to build an inclusive information society by 2020. The Connect 2020 Agenda and 2016-2019 Strategic Plan was adopted at the ITU 2014 Plenipotentiary Conference (PP-14) by Resolution 200 "Connect 2020 Agenda for Global Telecommunication/ICT Development". It sets the high-level impact representing the change in the ICT sector. The "Connect 2020" vision is "an information society, empowered by the interconnected world, where telecommunication/ICTs enable and accelerate social, economic and environmentally sustainable growth and development for everyone".

The four key goals that are part of the 2016-2019 ITU Strategic Plan contain measurable targets to be achieved by 2020 in the areas of telecommunications/ICT growth, inclusiveness, sustainability, and innovation and partnership. There is shift from connectivity to the value and opportunities created by connectivity, which could help ease social problems such as inequalities in education between rural and urban areas in both developing and developed countries.

The four key goals and targets are the following:

Goal 1 Growth: Enable and foster access to and increased use of telecommunication/ICT

Target 1.1: Worldwide, 55% of households should have access to the Internet by 2020

Target 1.2: Worldwide, 60% of individuals should be using the Internet by 2020

Target 1.3: Worldwide, telecommunication/ICT should be 40% more affordable by 2020

Goal 2 Inclusiveness: Bridge the digital divide and provide broadband for all

Target 2.1.A: In the developing world, 50% of households should have access to the Internet by 2020 Target 2.1.B: In the least developed countries (LDCs), 15% of households should have access to the Internet by 2020

Target 2.2.A: In the developing world, 50% of individuals should be using the Internet by 2020

Target 2.2.B: In the least developed countries (LDCs), 20% of individuals should be using the Internet by 2020

Target 2.3.A: The affordability gap between developed and developing countries should be reduced by 40% by 2020

Target 2.3.B: Broadband services should cost no more than 5% of average monthly income in developing countries by 2020

Target 2.4: Worldwide, 90% of the rural population should be covered by broadband services by 2020

Target 2.5.A: Gender equality among Internet users should be reached by 2020

Target 2.5.B: Enabling environments ensuring accessible telecommunication/ICT for persons with disabilities should be established in all countries by 2020

Goal 3 Sustainability: Manage challenges resulting from telecommunication/ICT development

Target 3.1: Cybersecurity readiness should be improved by 40% by 2020

Target 3.2: Volume of redundant e-waste to be reduced by 50% by 2020

Target 3.3: Green House Gas emissions generated by the telecommunication/ICT sector to be decreased per device by 30% by 2020

Goal 4 Innovation and Partnership: Lead, improve and adapt to the changing telecommunication/ICT environment

Target 4.1: Telecommunication/ICT environment conducive to innovation

Target 4.2: Effective partnerships of stakeholders in telecommunication/ICT environment

Regional Strategies

Some regions are developing regional ICT strategies. One example is the 2010 Framework for Action on ICT for Development in the Pacific (FAIDP). The document defines a new approach to developing and improving ICT services in order to support development, strengthen governance and improve the livelihoods of communities in the Pacific region. The vision is to improve livelihood of Pacific communities through effective utilization of ICT. The main goals are access to affordable ICT, efficient and effective utilization of ICT for sustainable development, adoption of ICT as a national priority in Pacific communities.

The themes categorize the ICT priority areas and reflect commonalities and have been structured so as to provide a rationale, long-term objectives, key priorities, targets and milestones, policy objectives and regional strategies for 2011–2015. Key priorities refer to a better coordination of regional and national ICT initiatives in the Pacific, engagement of development partners and key stakeholders in ICT development, establishment of partnerships and strategic engagement between regional and international organizations to reduce duplication of efforts, exploit synergies and utilize complementary activities. The seven themes are (1) Leadership, governance, coordination and partnerships; (2) ICT policy, legislation and regulatory frameworks; (3) ICT human capacity building; (4) ICT infrastructure and access; (5) International connectivity; (6) Cyber security and ICT applications; (7) Financing, monitoring and evaluation.

One of the important objectives is the establishment of cost-effective regional strategies for the provision of international connectivity through fostering regional cooperation on submarine cabling and other infrastructure arrangements such as maintenance of regional fiber optic networks.

The Pacific ICT Ministerial Meeting which was held in September 2015 had the aim to inform key decision makers about the results of the FAIDP Review including issues, challenges, opportunities, and suggestions and prepare a draft of the Next Action Plan e.g. the Pacific Regional ICT Strategic Action Plan (PRISAP) for the years 2016-2020.

Another example is the Digital Agenda for Europe which aims to boost Europe's economy and help Europe's citizens and businesses to get the most out of digital technologies. Europe's Digital Agenda forms one of the seven pillars of the Europe 2020 Strategy which sets objectives for the growth of the European Union by 2020. The Digital Agenda's main objective is to develop a digital single market in order to generate smart, sustainable and inclusive growth in Europe and it is made up of the next seven pillars:

1. Achieving the digital single market;
2. Enhancing interoperability and standards;
3. Strengthening online trust and security;
4. Promoting fast and ultra fast Internet access for all;
5. Investing in research and innovation;
6. Promoting digital literacy, skills and inclusion;
7. ICT-enabled benefits for EU society.

The pillar "Promoting fast and ultra fast Internet access for all" is due to the fact that new services, such as high definition television or videoconferencing, need much faster internet access than generally available in Europe. The strategic plan is to match world leaders like South Korea and Japan. For this Europe needs download rates of 30 Mbps for all its citizens and at least 50% of European households subscribing to Internet connections above 100 Mbps by 2020.

The Digital Agenda aims to turn this ambition into reality by stimulating investments and proposing a comprehensive radio spectrum plan. It was estimated that if the full implementation of the Digital Agenda will increase the European GDP by 5%, or EUR 1,500 per person, over the next eight years.

National digital strategies

National digital strategies are cross-sectoral by nature and in many instances are designed to boost countries' competitiveness, economic growth and social well being.

Many countries have established or are close to adopting national strategies addressing policy priorities related to the digital economy. Among them are Denmark's ICT Growth Plan, Italy's Strategy for the Digital Agenda 2014-2020, Mexico's National Digital Strategy (2013), Germany's Digital Agenda 2014-2017, Digital Czech v 2.0, Plan France Numérique, Luxembourg's Digital Lëtzebuerg, Digital Agenda for Norway, Information Economy Strategy of the United Kingdom, Digital Agenda for Austria, Digital Agenda for Sweden. Digital Canada 150, Agenda Portugal Digital.

Generally all countries aim to further develop the telecommunications infrastructures and services, promote the ICT sector. Almost all national digital strategies have the following key goals:

1. development of ICT modern infrastructure: maximize access, increase speed and capacity of broadband, increase coverage of the country especially in remote areas, offer more variety of ICT services and increase their quality, preserve the open Internet;

2. development of digital local content,: build open administration by strengthen e-government services, enhancing access to governmental and public information, and development of e-business, e-health, e-education, e-inclusion,

3. ensure security, privacy and trust in ICT.

The strategy "Britain´s Superfast Broadband Future" was adopted in 2010, has been updated in 2012, 2013 and is valid until 2017. Firstly, the strategy has the aim to ensure superfast, higher bandwidth, and more reliable services for consumers and businesses. Secondly, it wants to ensure high-quality broadband to mobile devices. In order to achieve this, a mix of technologies –fixed, wireless and satellite – will be needed to deliver superfast broadband throughout the UK. Government has set a target to release at least 500 MHz of public sector spectrum below 5GHz by 2020 for mobile communications uses, including mobile broadband. Britain's approach to delivery remains technology-neutral, although high-capacity fiber optic deeper into the network is likely to be a key feature of the UK's network going forward. Whether this is directly to people's homes, a street cabinet or to a pole will depend on local circumstances. In 2011, the government allocated £100 Mio for an Urban Broadband Fund developing ten super-connected cities across the UK, followed in 2012 by a fund of £50 Mio for other 12 cities to benefit from this program. Britain's rural broadband program grants money to local authorities (and devolved administrations, in Scotland, Wales and Northern Ireland), that have set out plans to raise additional

money locally so that the communities are able to contract a private sector company to deliver broadband to those areas which do not already have access.

Japan's strategy has the aim to secure that the IT infrastructure environment is at the world's highest levels. In terms of broadband infrastructure the strategy envisages that the "Construction of ultra-high-speed broadband infrastructure will be promoted to enable comfortable and easy connections from anywhere in Japan at optical fiber speeds (in excess of 100 Mbps) for high-quality and high-reliability mobile access". Beside the main development goals it also includes policy measures to ensure the use of ICTs during large-scale natural disasters through higher resilience and redundancy of ICT infrastructures. The measures include: (i) redundancy in international IT infrastructure including undersea cables; (ii) regional distribution of data centers (which are currently concentrated in the Tokyo region); and (iii) regional collaboration to encourage distribution of Internet exchanges and backup systems.

Poland's national broadband strategy was adopted in November 2013 and remains valid until 2020. The national broadband plan foresees that 100 % of households and companies should have access to internet connectivity of which at least 30 Mbps until 2020 and 50 % of households and companies have access to internet connectivity of 100 Mbps until 2020. The focus is mainly on promoting broadband investments and expansion through initiating regulatory measures. The funding for broadband will be carried out mainly via a dedicated Operational Program 2014-2020 Polska Cyfrowa (Digital Poland). The budget projected by the Polish government for the OP Digital Poland is 2.255.600 Mio EUR. In terms of enhancing access the focus will be on NGA with a priority on rural areas. Broadband access below 30 Mbps can be funded only exceptionally, in remote areas.

Portugal's Agenda Portugal Digital, adopted in 2012, has five priority areas of intervention - Next Generation Networks, Better Governance, Excellence in Education, Proximity Healthcare and Smart Mobility and aims to promote the development of broadband infrastructure to facilitate access for all citizens to broadband speeds equal or over 30 Mbps by 2020. The Portuguese government launched five public tenders for the deployment of high-speed networks in rural areas, involving 139 municipalities covering more than 1 million people and investments worth EUR 156 million.

Luxembourg's Digital Lëtzebuerg envisions an ambitious roll out of countrywide ultra-high broadband connections and plans to offer 100% of the population the possibility to opt for a 1 Gbit/s downstream/500 Mbit/s upstream or faster domestic connection by 2020.

China's 2006-2020 National Informatization Development Strategy was revised on September 5, 2014. The objectives of the Strategy refer to stimulating the basic transformation of economic growth models; broadly applying information technology, transforming and upgrading traditional industries, developing information service sectors, promoting the strategic adjustment of industrial structures; using applied information technology, striving to reduce energy and material consumption of work units and products, expanding supervision and control over environmental pollution, serving the development of a recycling economy.

1.2. Future trends and strategic priorities

New strategies and trends in ICT development in the world

The new economy, the Information Society and associated transformations and opportunities reach out and engage all countries.

The transition to the Next Generation Networks (NGN) is one of the main trends of the ICT industry in recent years. NGNs are fully converged IP networks in which a single service provider offers every different type of communications services and consumers benefit from new services and lower prices, as well as greater convenience through multifunction devices and through "triple" or "quadruple" play bundles that combine all communications services into one package. NGNs, mainly based on fiber optics, continue to be deployed around the world with countries taking different regulatory and market approaches to promote deployment.

In the last decades, telecommunication and TV companies began to upgrade their networks and replace some of their infrastructure for the access to subscribers with a fiber optic network called New Generation Access Network (NGA). NGA, mainly based on fiber optics, continue to be deployed around the world with countries taking different regulatory and market approaches to promote deployment.

The Asia-Pacific region is ahead of other regions in developing NGA infrastructure and access, which tends to be financed by the operator with strong governmental support and a strong preference for FTTH. The European approach has been to promote competition through open access requirements. EU countries introduced the rules that require operators with significant market power (SMP) to provide wholesale access to the local loop in a transparent, non-discriminatory and cost-oriented manner.

Another trend in the ICT development, in recent years, is the access to broadband Internet that is vital for developing nations as well. The ITU's project *"Build on Broadband"* has the aim to promote equitable, affordable broadband access to the Internet for all people, regardless of where they live or their financial circumstances. Broadband allows moving large volumes of data almost instantaneously to widely dispersed locations at low cost. A broadband platform can deliver telecommunications services, information services, broadcasting services and much more. In addition, broadband is helping to reduce carbon emissions through environmentally friendly types of business practices, such as remote control equipment, telecommuting and video conferencing in real time and can lead to a reduction in carbon emissions in an amount five times greater than the emissions produced by ICT industry.

For a better adaptation to the new converged environment, governments have also engaged in the development of coherent national broadband strategies as essential components of the total deployment of broadband services and access to them.

OECD countries that are leading in terms of broadband penetration, as a rule, implemented a national policy on broadband. These countries include the Republic of Korea, Denmark, Netherlands, Sweden, Finland and United Kingdom.

The Digital Agenda for Europe defines the next broadband targets:

- basic broadband for all by 2013: basic broadband coverage for 100% of EU citizens;

- fast broadband by 2020: broadband coverage at 30 Mbps or more for 100% of EU citizens; and

- ultra-fast broadband by 2020: 50% of European households should have subscriptions above 100Mbps.

On that basis all EU countries are developing national broadband strategies.

An important area from the economic point of view is the Internet address space. In the Declaration of the Committee of Ministers on the management of the Internet protocol address resources in the public interest, the EU Council of Ministers stressed the importance of the shortage of Internet resources, in particular, addresses, IPv4. It is also noted that is necessary to ensure timely and effective transition to the new Internet Protocol IPv6, significantly expanding the address space in the public sector and immediately start the preparatory processes for the transition to IPv6 and its implementation in the private sector.

In the transition from analogue to digital broadcasting the need for radio spectrum will be reduced, while the released by the band ultra high frequency (UHF) is called the digital dividend and can be used for other applications.

The ITU World Radiocommunication Conference 2007 (WRC-07) identified an additional bandwidth of 72 MHz of radio frequencies in the upper part of UHF (790-862 MHz) for mobile services in Region 1 since 2015. This allowed a number of countries in Region 1 to immediately begin using this band, subject to certain conditions.

The European Commission has adopted recommendations on the use of the digital dividend - the frequency range 790-862 MHz. Right from the beginning it was supposed to pass for the use in ground-based systems designed to provide electronic communications services - in particular for wireless broadband access. Currently, the range is proposed to be used in agreement among all European Union countries for the same services. In this view research on the compatibility and advice is being conducted.

The problem of the digital dividend under the number 1.17 is included in the agenda of the World Radiocommunication Conference 2012 (WRC-12), and currently preparatory work is conducted for the elaboration of recommendations.

It is also now recognized the role of fixed infrastructures as a critical building block for offloading and backhauling wireless traffic and to enable better use of available spectrum. The complementarities of fixed and mobile networks is one reason why emerging economies with less developed fixed networks face greater challenges in leveraging the rapid growth of wireless services.

The mobile networks are looking to the next generation of technology to deliver the data capacity that customers are demanding. The 2 and 2,5 Generation mobile networks were established to support a real-time voice service which supported roaming between cells. Today, devices such as smartphones and tablets make very different demands on the network infrastructure, requiring operators to meet customer expectations of mobility, but with rapidly growing demands for data downloads. Mobile operators are primarily looking to Long Term Evolution (LTE) as the technology to deliver these services and this leads to far more integration of networks at an operational level.

The targets for LTE indicate bandwidth increases as high as 100 Mbps on the downlink, and up to 50 Mbps on the uplink. LTE is optimized for data traffic, and it is replacing the existing, circuit-switched voice 2nd Generation Global Standard for Mobile Telephony (GSM) and 3rd Generation Universal Mobile Telecommunications System (UMTS) networks, with an network designed so that it separates out the data transport (bit carriage) from the applications that use the network.

The next generation wireless networks could make a significant contribution to the fast and superfast broadband network.

Developments in fixed wireless access are concentrated on WiMax. WiMax (Worldwide Interoperability for Microwave Access) is a wireless technology, similar to WiFi, but with a longer range which can cover many kilometers. WiMax has been considered as a wireless alternative for an access technology to provide high speed access links instead of using copper to properties. Currently, the technology provides up to 75 Mbps symmetric broadband speed without the need for cables but the latest versions under development could offer up to 1 Gbps to fixed locations. These high data rates are only available over short distances however and WiMax is primarily a data service although it can be used to deliver voice traffic.

The mobile and fixed wireless options can be deployed more quickly and cheaply compared to fixed wired networks, but these solutions should very much be seen as complementary to any deployment of superfast broadband over fixed-line technologies. Whilst the headline speeds won't reach the levels offered by fiber-based services, the greater mobility offered and variety of devices will deliver significant innovation in services and applications.

Another technology that can be used to deliver broadband services is satellite. Satellite is a option for the most remote users and for those in some other not-spots. It will need to be part of any solution aiming at universal coverage.

2. The policies and strategies (plans) of ICT development in the ECO Member States

Recognizing the social and economic benefits offered by high-speed communication networks, governments develop national ICT and broadband policies. As a rule, the top eight overall ICT policies and strategic priority areas in the world are the following:

- broadband networks development,
- ICT skills and employment,
- online government services,
- security of information systems and networks,
- research and development (R&D) programs,
- ICT technology diffusion to business,
- electronic settlement/payment systems, and
- digital content.

Afghanistan

The Ministry of Communications and Information Technology (MCIT) was the first among the new political entities in Afghanistan to design new strategies and policies on market liberalization that enabled the private sector to make huge investments in the telecommunication and IT sector. The first policy document was adopted in 2003 entitled "Information and Communication Technologies (ICT) Policy" where as objectives were the wide adoption of ICTs for improve all aspects of Afghan life, including education, health, employment and access to information, increase Government efficiency and growth of the local ICTs industry. The Action Plan and Strategy provided among others the adoption of e-commerce and basic digital signature legislation and the designation of the Ministry of Communications as a leading Government entity for ICTs, changing its name to the Ministry of Communication and Information Technology (MCIT) in 2007. Another body that was established is the National Information and Communications Technology Council of Afghanistan (NICTCA) with the aim to provide advisory services to the Government in all matters related to ICTs and to act as a coordinating focal point.

In July 2003, the Ministry of Communications adopted its telecommunications and ICT Policy in order to promote rapid telecom development through private sector investments. The objectives were the rapid development of the telecom sector by having multiple operators providing world-class quality services at reasonable prices. Building an adequate national telecommunications infrastructure in the country has been the top priority for the sector since 2003.

The next step in ICT development was the implementation of the Information and Communication Technology (ICT) Sector Strategy (2008- 2013).The main targets of the Strategy are:

1. telecom access to 80% geographic coverage of populated areas by 2010, ensuring equitable access to most of the population, including women. The approach taken to achieve this target is wireless service, which include cellular mobile services, fixed wireless access for broadband Internet and satellite solutions to the less populated areas where cellular mobile is costly;
2. transforming Afghan society into information based society by 2013.

The programs foreseen to meet the Strategy targets include: expansion of telecom service coverage to 3000 villages; creation of the national fiber optic ring to further enable national and international communications at lower prices with good quality and an integrated public safety broadband network, linking local, regional and national players; establishment of National Data Centre and Internet Exchange Point (IXP).

E-Afghanistan National Priority Program was designed for the development of the information society in the country and covers e-Government, cyber security, internet governance, building ICT capacity, localization and ICT standards. The program is oriented towards government/MCIT activities with particular focus on the development and implementation of e-Government services and applications. E-Government includes, among other objectives, the improvement and creation of websites for government agencies and seven national universities, the establishment of an ICT centre of excellence (Kabul IT-Park) to foster high-technology business, and improvement of ICT training and digital literacy.

Enabling Mobile Government (m-Gov) promotes the use of mobile applications throughout the government for better public service delivery and program management. It also includes an innovative grant program to assist ministries in implementing mobile-based solutions.

In 2008, the Universal Access Policy was approved and has as the objectives to introduce mechanisms that encourage investment for the development of rural communication networks and to fill the access gap in rural areas by subsidizing rural projects that are commercially viable and also projects that are not commercially viable.

The Open Access Policy of the MCTI (2012) ensures access to shared and scarce resources through the principles of non-discrimination, transparency and cost-based pricing. The Policy stipulates that ATRA has to regulate Afghan Telecom (incumbent operator) pursuant of the Open Access principles, regardless of its governmental or private ownership. In the long-term perspective (2014-2016) is planned to privatize Afghan Telecom (incumbent operator).

The IT Industry Development Policy for Afghanistan (2015- 2020) was drafted by the MCTI but has not yet been approved. The Policy vision is to exploit the potential of Afghanistan's present ICT and telecoms infrastructure by developing a sustainable National Information Technology and IT Enabled Services Industry (IT/ITES) that will generate job opportunities and create national wealth and prosperity for Afghan citizens within the next five years.

Azerbaijan

The National Strategy on Information and Communication Technologies (2003-2012) for the Development of the Republic of Azerbaijan was approved in 2003 that was an essential step in the development of the ICT in the country. In order to implement this Strategy the Government of Azerbaijan approved a number of complex measures to establish the legal framework on the information society, develop the human factor, ensure the rights of citizens to information, dissemination and use of the information, e-government, e-commerce, as well as in other directions. One of the main complex measures in the Strategy refers to the project "Electronic Azerbaijan" that was implemented in 2012. This project had the aim to ensure the application of information and communication technologies in public institutions, local authorities, as well as the improvement of all web resources for official entities and their divisions.

In order to further accelerate the ICT development in Azerbaijan, the National Strategy for Information Society Development in Azerbaijan 2014-2020 was approved on 2nd of April , 2014 and foresees that it should be implemented in two stages: the first phase covers 2014-2017 and the second one - 2018-2020. Each stage is accompanied by public programs. The State Program for the implementation of the first phase of the Strategy is in force. The main objective of the Strategy is to build an information society and effective use of its capabilities by citizens, society and the state for the sustainable socio-economic, cultural and economic development of the country, including the development of ICT. The strategy takes into account all the experiences and recommendations of the International Telecommunication Union (ITU), the European Union (EU) and UNESCO. Bringing ICT infrastructure and services to international standards, developing and strengthening the scientific and technological potential in the field of high technology, increasing the role of "e-government" and ICT, as well as improving human resources and information security are among the main goals of the Strategy. The strategic main targets are as follows:

 − In 2015 - Completion of digital switchover;
 − From 2016 till 2017 – Full coverage of fiber network across the country and ensuring 85% of broadband penetration;
 − From 2017 till 2018 –Launching observation and telecommunication satellites;

- In 2019 – Full range of public services delivery via e-government portal;
- End of 2020 – Ensuring the digitalization (networking) index of Azerbaijan to reach the level of developed countries.

Strengthening the competitiveness and export of products in the field of ICT is an important aspect of the National Strategy. The development of high technologies including aerospace, nuclear and nanotechnology, biotechnology, electronics are also highlighted in the document. The Ministry of Communications and High Technologies is acting as a coordinating entity for implementation of the Strategy.

Iran

In Iran the policy on telecommunications development was included in the five-year cycles Economic, Social and Cultural Development Plans (ESCD). In the first and second ESCD the development of telecommunication was attributed exclusively to the state companies that performed expansion and improvement of telecommunications services in urban and rural areas, providing local, long distance and international services. In 2000 there was a fundamental shift in the telecommunication policy related to a transfer of some services (maintenance, operation, engineering, installation, etc.) to private and cooperative sectors. At that time Principle 43 and 44 of the Constitution of the I.R. Iran stated for the prohibition of monopolies as one of the fundamental principles of the Iranian economy. The third ESCD provides for the elimination of monopolies in some sectors including communications. However the establishment and maintenance of backbone networks, regulation of the radio frequency spectrum and ensuring the continuing supply of postal and telecommunications services falls within the competence of the state. The non-governmental sector became also a player in the telecommunications field that was authorized to operate in parallel telecommunications networks providing mobile cellular services, paging services, data transmission and local fixed telephone services.

In the 20-Year National Vision of the Islamic Republic of Iran till 2025 the information society is mentioned as an important priority with an emphasis on high tech (software) knowledge production.

In the fourth ESCD (2005 to 2009) was stated that the communications and information technology will expand to materialize knowledge based economy and reach a regional development, as well as facilitate communication with standard quality. The ESCD (2005 to 2009) also provided new opportunities for services supply for families and companies. It also aimed to achieve at least 50% in fixed telephones penetration rate, 35% mobile phones and 30% Internet usage and high speed links at least in cities with more than 50,000 inhabitants; offer basic telecom and IT services throughout the country.

Iran's National ICT Agenda (TAKFA/ INICTA) was initiated by the Government and approved by the Cabinet of Ministers in June 2002. Its aim is to develop and maintain an advanced technological environment in order to support and enhance the education, research, and learning, service, and administrative activities all over the country. TAKFA mission was to foster the development of economic, social and cultural situation in Iran by achieving the following objectives: (i) Creation of infrastructure of Iran's information and communication technology (network, law and security); (ii) Compilation and application of comprehensive information society system of information and communication technology; (iii) Development of productive and beneficial employment; (iv) Promotion of average level of skills in information and communication technology (individual and institutional); (v) Implementing of flagship projects; (vi) Increase in the economic and financial capabilities; (vii) Promotion of private sector's

participation in ICT market; and (viii) Groundwork for entry into the international market of ICT. The results of its implementation are that Iran becomes a rapidly growing ICT market, the national information infrastructure is rapidly growing, existence of a well-defined national agenda and dedicated budget, and Iranian companies are looking for capable foreign partners.

The I.R.Iran's Fifth Development Plan, covering the period 2011 to 2015, has the next the priorities and goals: development of national network and data centers; connection of 60% of households and 100% of business units to the national network and internet; reaching to the 2nd place in the region by upgrading the indexes; increasing the share of ICT in the GDP growth to 2%. Broadband promotion was a key element of the Islamic Republic of Iran's Fifth Development Plan, covering the period 2011 to 2015. The Plan called for 36 million high-speed ports by 2016 and the development of robust fiber-to-the-home networks in the country's ten largest cities. The greater broadband connectivity is expected to be a continued goal of the country's Sixth Development Plan.

Pakistan

Pakistan' National IT Policy was approved in 2000. The main goal of the Policy was to stimulate widespread use of IT applications and Internet in government authorities, trade, industry, education, agriculture, health and other sectors. The chapter "IT Policy Strategy" identifies measures and recommendations on HR development, IT education, IT training, infrastructure development, technological parks establishment, databases and platforms, software industry development, etc. The IT Action Plan is an integrated part of the National IT Policy and included priority areas for intervention and project proposals for 2000-2001. Currently the Policy is being reviewed in light of the latest technologies and trends.

Special attention was paid for broadband deployment in the country and in 2004 the Broadband Policy was approved by the Ministry of Information Technology where the next objectives were envisaged to be achieved:

1. Spreading of an affordable, 'always on,' broadband high- speed Internet service in the corporate/commercial and residential sectors across Pakistan;
2. Encourage the entry and growth of new service providers while stimulating the growth of the existing ones at the same time;
3. Encourage private sector investment in local content generation and broadband service provision.

In order to transform Pakistan into an information society and knowledge based economy, as well as for the purpose of renewing earlier policies and integrate them into a consolidated policy document , the new Telecommunications Policy was approved in December 2015 which has replaced the previous sectorial policies.

The Policy is aimed to facilitate the attainment of an all-embracing national agenda and to transform Pakistan into an economically vibrant, knowledge-based, middle-income country by 2025.The Telecommunications Policy 2015 vision is to ensure universally available, affordable and quality telecommunication services provided through open, competitive and well managed markets which can be used by people to the benefit of the economy and society. It covers nine areas such as telecommunications market and services, use of telecommunications services, telecommunications infrastructure, satellite

telecommunications, broadband services and spectrum, telecommunications law and regulation, Universal Service Funding and Research&Development through the National ICT R&D Fund.

Broadband proliferation has been given a special attention and separate section is included. The main goal of broadband implementation is widespread availability of affordable broadband services provided over fixed or mobile networks with characteristics that support contemporary and new digital applications and content. The Policy contains many measures and initiatives that are intended to support the goals of universal availability and increasing affordability of broadband services.

Besides approving and publishing the spectrums strategy, the new element of the Policy relates to introduction of the market mechanisms for more efficient use of frequency spectrum like spectrum assignment by auctions, re-farming and spectrum trading under specific conditions.

Kazakhstan

The basic tools for setting up the information society in the Republic of Kazakhstan are two concept papers: "The Program for the Development of Information and Communication Technologies in the Republic of Kazakhstan for 2010 - 2014" approved by Decree of the Government of the Republic of Kazakhstan No. 983 dated September 29, 2010 and the "State Program "Information Kazakhstan - 2020". Important preconditions for an information environment to be established in Kazakhstan were included in the framework of the Concept on Formation and Development of a Unified Information Space of Kazakhstan segment of the Internet (Kaznet) for 2008-2012 that was approved by the Decision of the Government of the Republic of Kazakhstan No. 358 of April 17, 2008. The State Program "Informational Kazakhstan – 2020" was approved by the Decree of the President of the Republic of Kazakhstan No. 922 dated February 1, 2010 "On the Strategic Plan for the Development of the Republic of Kazakhstan until 2020", as part of the support and improvement of the ICT sector. This is the key strategic document which contains a two stages plan (1 stage - 2013-2017; 2 stage - 2018-2020) for the ICT implementation in all sectors of the national economy which is expected to provide a sound informational and communication infrastructure in the country, improve the quality of public administration system and the socio-economic informational environment. The main objective of the "Informational Kazakhstan - 2020" is to create conditions for transition to the information society in Kazakhstan. The state programmeme is aimed at meeting the challenges of public administration effectiveness, accessibility of innovation, informational and communication infrastructure, establishment of informational environment for socio-economic and cultural development of society and the development of the national information space. The Strategic Plan envisages that Kazakhstan by 2020 should be ranked in the list of first 35 countries in the rating of Doing Business of the World Bank, and in the Index of «electronic government» rating to be in the first 25 countries. By 2020 Kazakhstan is expected to have the next indicators of ICT development:

- Access of informational communication infrastructure in household of Republic of Kazakhstan - 100 %;
- Percentage of Internet users in 2020 – 75 %;
- Population coverage by radio digital TV and radio broadcasting – 95%;
- Share of the organizations of health care connected to a single network of health care – 100%;
- Share of the scientific educational institutions connected to a single national scientific and educational network - 100%;
- Level of computer knowledge – 80 %;

- Share of electronic mass-media to total number of the mass-media registered in Kazakhstan – 100%;
- Share of a turn of the Kazakhstan online stores in a total turnover of the goods and services paid electronically – 40%;
- Share of the state services provided in an electronic format - 50%.

In case of effective implementation of the State Program "Information Kazakhstan - 2020" Kazakhstan should be able to consolidate its status as a leader in the development of the information society among the Central Asian region by 2018 - 2020.

Kyrgyzstan

The current stage of information society development in the Kyrgyz Republic is determined by the effective implementation of the National Strategy "Information and Communication Technologies for Development of the Kyrgyz Republic", approved by the Presidential Decree No. 54 as of March 10, 2002. This document takes into account the developmental aspects of the Information Society as one of the directions of building a "digital economy." The objectives of the National Strategy are to promote the information society in the Kyrgyz Republic; to establish an effective, transparent and accountable public administration by using the ICT; to create a single information space and conditions for the development of all regions of Kyrgyzstan and ensure that all citizens have the equal access to information.

One of the main tasks of the country is to integrate into the global information society and bridging the digital divide. The ICT infrastructure development envisages the establishment of a new model of infrastructure and the implementation of new generation networks (NGN). As part of the infrastructure development strategy it is aimed to achieve 100% of country's coverage by the radio and television broadcasting on the basis of new technologies and to increase three times the density of telephone penetration in the rural areas. In order to improve the ICT-based public central and local administration the Strategy stipulates the setting up of "e-government" which includes electronic document management system, portal of public services, state registers, regional and local databases included in one information system. One of the objectives of the Strategy is that Kyrgyzstan should become a regional leader in the provision of information and communication services for the real sectors of economy, banking, business management, etc. so that there would be regional centers in Kyrgyzstan for the Central Asia businesses. Since 2004 a national ICT conference is being organized on a yearly basis where the state's action plans are discussed and agreed for the subsequent year.

Largely due to the implementation of the National Strategy, Kyrgyzstan has significantly improved its position in the ranking of the information society and has made progress in the development of telecommunications infrastructure.

Tajikistan

Over the period of 15 years a number of documents that define the policy and strategic development of ICT in the country were adopted in the Republic of Tajikistan. The State Strategy on Information and Communication Technologies for Development of the Republic of Tajikistan, adopted in 2003, has the scope to develop measures that are aimed to create conditions and mechanisms for the promotion of the information society in the Republic of Tajikistan, as well as the development and renewal of various

sectors (education, culture, health, transport, agriculture, social life, social protection and others) on the basis of the use of ICT.

The Economic Development Program of the Republic of Tajikistan until 2015 contains a chapter on communications that sets a number of goals and objectives for the development such as: (i) increasing by 2015, compared to 2000, the volume of paid services to 68,4%, while revenue from services rendered – to 91,6%; (ii) expanding the network of international telephone connections with access to the CIS countries; (iii) replacing analogue exchanges to digital till 2015, increasing the capacity of telephone exchanges by 2015 compared with 2000 by 11,2% or 33,4 thousand numbers with an increase in the number of main telephone 42,8 thousand units; (iv) creating in Dushanbe a fiber-optic ring network, which will combine all the city exchanges with each other and increase the number of the Internet users by 11,6 times, installation in remote areas of the country of satellite digital communication systems.

The Concept on National Information Policy provides strategic directions for the Government information policy. That includes the creation, development and security of government information resources and a wide application of information technologies in public administration, management, social, economic and other systems. The Program on the Implementation of the Concept was approved in 2009 which contains a detailed Action Plan for its implementation. It is envisaged that the Program will be implemented in three phases: the first phase (2010 - 2014) - development, improvement and harmonization of regulations, the establishment and creation of relevant public authorities and institutions arising from the substantive provisions of the Concept on National Information Policy of the Republic of Tajikistan; second and third phases (2015 - 2019 and 2020 - 2024) - the practical implementation of the plans and objectives, achieving the basic objectives of the Program.

In 2009 the Concept on State Policy of the Republic of Tajikistan on Television and Radio in 2010-2025 was approved, followed by the State Program of Development of Digital Television in 2010-2015 and Transition to Digital Broadcasting. The implementation of the Program is scheduled in 6 stages. The first stage envisaged for 2010 covers the city of Dushanbe, the remaining stages are distributed over the years and include coverage all over the country. Full transition to digital broadcasting is to be implemented by the end of 2016. It was decided to apply the pan-European standard DVB (Digital Video Broadcasting) in Tajikistan. As a compression standard used in digital terrestrial broadcasting is planned to apply the MPEG-4 standard.

Turkey

The transformation into an information society in Turkey started since early 2000 when Turkey has become a party to the eEurope+ Initiative, which has been designed for EU candidate countries in 2001. Turkey has also adopted the EU's Lisbon Strategy targets and is a party to international initiatives on information society.

The "e-Transformation Turkey Project" was launched in 2003 with the aim to carry out the process of transformation into an information society in a harmonious and integrated structure covering all the society - citizens, enterprises and public segments. The general coordination of the Project was ensured by the State Planning Organization and the e-Transformation Turkey Executive Board. There were two action plans prepared and implemented for the periods 2003-2004 and 2005. In line with this process the Turkey's Information Society Transformation Policy has been adopted by the e-Transformation Turkey Executive Board. The policy document states Turkey's vision of transformation into an information society as follows: "To be a country that has become a focal point in the production of science and

technology, that uses information and technology as an effective tool, that produces more value with information-based decision-making processes and that is successful in global competition, with a high level of welfare".

However during the first stage various initiatives were carried out independently based on the priorities of some institutions instead of the country's priorities. In July 2006 the Information Society Strategy and the annexed Action Plan 2006-2010 was adopted by the High Planning Council to enable Turkey to benefit effectively from the ICT and to identify the mid and long-term strategies and targets for the realization of transformation. The Information Society Strategy comprised five Strategic Directions and targets that had to be achieved till 2010. A new information society strategy and action plan for the period 2015-2018 was prepared under the lead of the Ministry of Development. As a result the "2015 – 2018 Information Strategy and Action Plan" is adopted by Supreme Planning Council and published in the Official Gazette on 6 March 2015. The Strategy aims to promote "growth and employment in accordance with the 10th National Development Plan (2014-2018) and the 2023 goals of the Turkish government". Also, the document determines policy and several actions of broadband infrastructure and services deployment. For broadband deployment document stables in "Broadband Infrastructure and Sectorial Competition" section the following priorities: increasing effectiveness of regulations, supporting broadband infrastructure investments (especially in underserved regions), encouraging domestic production of telecommunication equipment, promoting R&D activities on 5G technologies, establishing Internet exchange points in Turkey.

The 2016-2019 National e-Government Strategy and Action Plan was prepared within the scope of Turkey's 2023 vision, the Tenth Development Plan and the 2015-2018 Information Society Strategy and Action Plan, with consideration for the strategic plans of agencies and institutions, other national strategy documents ("Action Plan Program to Reduce Shadow Economy", "The National Cyber Security Strategy and Action Plan", "Transportation and Communication Strategy Target 2023 of Turkey", etc.) and the needs of all stakeholders in the e-Government ecosystem. International documents like the European Union "Digital Agenda for Europe A 2020 Strategy Initiative and 2016-2020 e-Government Action Plan", the United Nations "Sustainable Development Goals perspective" and the Organization for Economic Cooperation and Development's "Recommendation of the Council on Digital Government Strategies" were important references in the preparation of the Strategy and Action Plan.

The 2016-2019 National e-Government Strategy and Action Plan is Turkey's first comprehensive and holistic national e-Government strategy and action plan, shaped by a collective intellectual and scientific perspective based on analysis activities, which included central government units, local governments, citizens, the private sector, professional organizations, non-governmental organizations and universities.

The 2016-2019 National e-Government Strategy and Action Plan will provide the acceleration needed to guide Turkey's digital transformation and achieve social, economic and environmental development. In the new term, e-Government will be more Integrated, Technological, Participatory, Innovative and Qualified with its focus on being an "EFFICIENT e-Government Ecosystem" with a more competent and agile position as the enabler of transition to an information society and sustainable development. With the implementation of the e-Government Strategy and Action Plan, the objective is to develop the necessary capacity in line with Turkey's 2023 vision, and create an elevating effect for the welfare of the country.

The macro level indicators that are listed below have been assigned as the success criteria for the 2016-2019 National e-Government Strategy and Action Plan. Once the Action Plan is completed, the objective is to achieve higher levels in the macro level indicators:

• efficiency of e-Government service delivery;

• usage of e-Government services;

• satisfaction with e-Government services;

• public value provided by e-Government;

• the position of Turkey in international e-Government indexes.

For the100 Anniversary of the Republic in Turkey were defined the ICT strategic development targets for the period until 2023. These priorities, defined in the Strategy of Transport, Maritime and Communications announced in 2013, are as follows:

1. Provide High-speed internet access, to install fiber optic networks all over the country and to be an inter-exchange point between countries of the region.
2. Reach 100% of household penetration rate with fiber and extend broadband wireless access infrastructure all over the country (LTE, 4G, WiMax).
3. Reach at least 100 Mb/s to all households by means of next generation fixed and mobile technologies.
4. Provide the broadband accessibility (fixed or wireless), Internet services at anywhere, for anyone and at any time (ubiquitous network) at reasonable prices.
5. Increase the number of Internet users to 80% of population between ages of 16-74.
6. Provide e-signature or m-signature for every citizen.

Uzbekistan

There are several documents that define the policy and strategic priorities of ICT development in Uzbekistan. One of most important is the Integrated National Program for Development of Information and Communication System of the Republic of Uzbekistan for 2013-2020, adopted on July 9, 2013. This Program outlines such tasks as the establishment of modern ICT infrastructure in the country and the development of e-Government, by providing the opportunity to communicate with government authorities in electronic form, the implementation of the "single window" system for the Government. The Program also determines measures to create complex information systems and databases of the "electronic government" through portal online public services www.my.gov.uz .

Later on the Presidential Resolution "On measures for further implementation of information and communication technologies in the real economy" was signed on April 3, 2014, which contains the most important tasks and directions for the development of ICT in the real economy: widespread adoption of ICT and software products, improving the quality of products and services, introduction of new product sale schemes by enterprises through the Internet; organizing an effective system of advanced ICT training and retraining. The Resolution has also approved the list of priority projects for bringing information and communication systems and products into the real economy sectors (2014-2015). Some of the major priority projects were included in the investment program of Uzbekistan. Every year, before 1st of June, lists of new projects will be developed to be included in the investment program.

The Interagency Coordination Council on the Development of Computerization and ICT under the Cabinet of Ministers of the Republic of Uzbekistan (www.ictcouncil.gov.uz) and the Ministry of Development of Information Technologies and Communications of the Republic of Uzbekistan are in charge of ICT development.

Broadband policies and strategies

Seven of the 10 ECO countries have established the broadband development targets in the sectorial policies and strategies. The remaining three countries (Tajikistan, Turkmenistan, and Uzbekistan) have no such provisions. No ECO country has a special strategy devoted to the broadband development. The Table 1 presents the national documents of the ECO countries where there are broadband development targets.

Table 1. National policy and strategic documents on broadband development

Country	Year of approval	Name of the document
Afghanistan	Yes, 2008	Afghanistan National Development Strategy: 1387 – 1391 (2008 – 2013) - ANDS in the chapter dedicated to the Information and Communication Technology
Azerbaijan	Yes, 2014	"Azerbaijan 2020: Look Into The Future". National Strategy for Information Society Development in Azerbaijan for 2014-2020
Iran (I.R.)	Yes, 2011	National Information Network
Kazakhstan	Yes, 2010	Program of ICT Development
Kyrgyzstan	Yes, 2006	Program of Information and Communication Technology Development
Pakistan	Yes, 2015	The Telecommunications Policy 2015
Tajikistan	No	
Turkey	Yes, 2013, 2015	Strategy of Transport and Communications, Target 2023, 2009-2013 Strategic Ministerial Plan. 2015-2018 Strategy Document of Ministry of Development, Information Society and Action Plan (2015)
Turkmenistan	No	
Uzbekistan	No	

3. Developing ICT infrastructure, implementing new technologies and services: development of the telecommunications sector in the ECO Member States

3.1. Market and infrastructure development

a) ICT market development

Over the last decade much has been achieved in the development of the telecommunication markets with the mobile and Internet segments being the most competitive and liberalized in nearly 95% of countries. However, this is not the case for all market segments. About 1/3 of countries worldwide have still monopolies in the basic telephony thus competition in basic telephony lags behind the other ICT markets. Regulators are continuing to open international gateways up to competition, but at a much slower rate than for other services. Leased lines and international gateways require further regulatory attention in order to spur broadband market growth in some developing countries.

b) fixed voice services

In recent years, fixed telephony is on the decline in all regions of the world. Fixed-telephone penetration decreased by about 2 per cent globally in 2013, and is set to drop to its lowest level in 14 years – lower than at the turn of the century – with the 1.1 billion subscriptions by end 2014.

The fixed telephony market of the ECO Member States represents 53,858,569 subscribers in 2014 from which 57% (30,588,405 subscribers) are in Iran and 23% (12,528,865 subscribers) in Turkey. Fixed-telephone penetration (see Figure 1) similarly with other regions of the world tended to decrease: in 2013, the average penetration in the region was 13.917%, and in 2014 it also decreased slightly and accounted 13.61%. By the end of 2014 the highest levels of penetration in the region are in Iran with 38.98% and Kazakhstan 26.12%, followed by Azerbaijan and Turkey with 18.87% and 16.52% respectively. In Turkmenistan the penetration constitutes 11.77%, in Uzbekistan - 8.55%, in Kyrgyzstan - 7.88% and in Tajikistan - 5.24%. The lowest penetration is in Afghanistan (0.33%) and Pakistan (2.65%). Even though the fixed telephone market in Iran would seem to be saturated, it still increases by approximately 0.7% annually. In 2014 the number of subscribers decreased in Turkey, Pakistan and Kyrgyzstan compared to 2013 and other countries in the region. While others managed to maintain the trend of increasing the subscribers base.

In all countries of the ECO region fixed-line services are still dominated by incumbents, while mobile services are fiercely competitive, with at least three mobile operators in each country (except Turkmenistan). Broadband communications are showing the greatest growth potential in those markets that are becoming generally more competitive.

Figure 1: **Fixed-telephone subscriptions per 100 inhabitants ECO 10 Countries**

Legend:
- ■ Fixed-telephone subscriptions per 100 inhabitants 2012
- ■ Fixed-telephone subscriptions per 100 inhabitants 2013
- ■ Fixed-telephone subscriptions per 100 inhabitants 2014
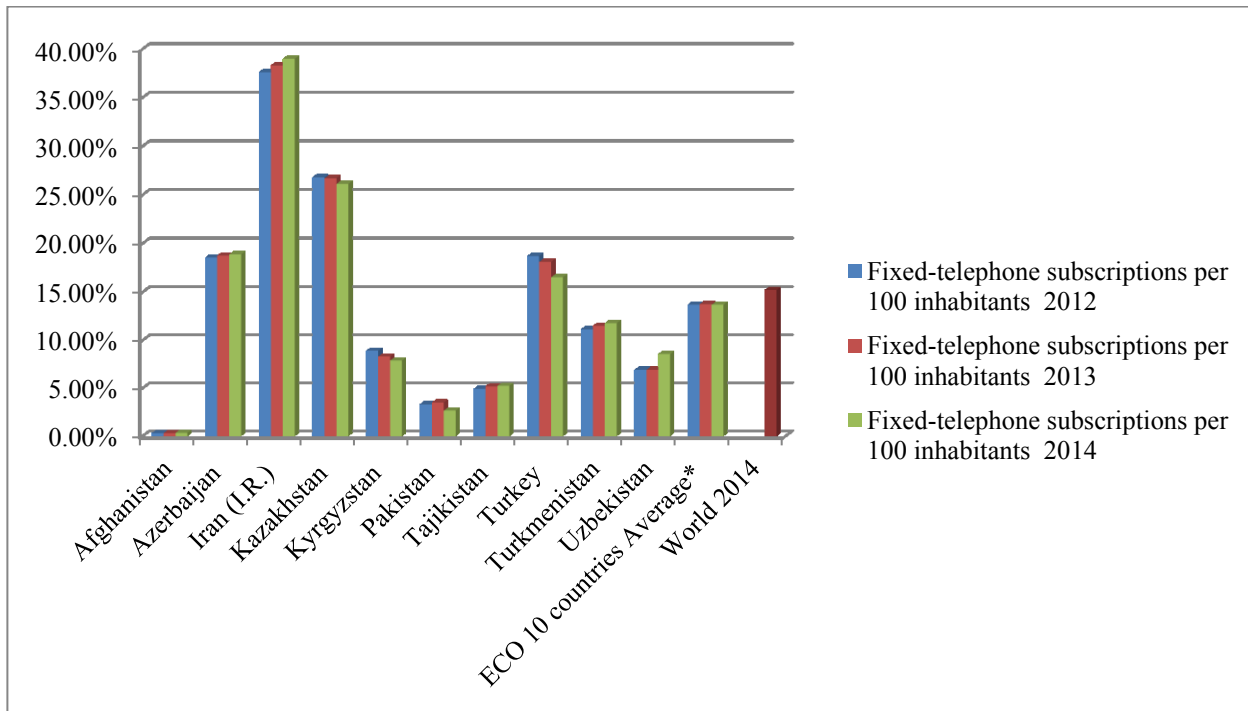
c) mobile communication services

The huge potential of wireless networks and services help promoting an information-based economy, developing and assisting sectors relying on information and communications technologies and overcoming the digital divide. This in turn ensures a sustainable and inclusive growth of a country.

By the end of 2014, there were almost 6.9 billion mobile-cellular subscriptions in the world, more than three quarters of them (5.4 billion) being in the developing world and more than half (3.6 billion) in the Asia-Pacific region. Penetration rates in the CIS countries, Arab States, Americas and Europe have attained levels above 100 per cent since 2012. Penetration rates in Europe by the end of 2014 were 124.7%, in CIS countries - 162.7%, in Americas - 108.5% and in Arab States - 109.9%.

Africa and Asia and the Pacific are the regions with the strongest mobile-cellular growth, and the lowest penetration rates that reached 69% and 89% respectively in 2014. Mobile-cellular population coverage has reached 93% globally: almost every person on the globe lives within reach of a mobile-cellular signal and can use the mobile communication services. Still there are 13% (309 millions peoples) of the population in Asia living in rural areas that are not covered by mobile-cellular networks.

By the end of 2014 the mobile-cellular market of the ECO Member States counted 382, 928, 703 subscribers that represented a regional penetration rate of 104.948% (see Figure 2). It is a continuously growing market with 3% annual growth. According to the number of subscribers, the largest markets are in Pakistan with 135,762,031 subscribers, Turkey - 71,888,416 subscribers and Iran - 68,891,151 subscribers. The level of penetration rate exceeding 100% is registered in Kazakhstan with 168.62%, Turkmenistan - 135.78%, Kyrgyzstan - 134.46% and Azerbaijan - 110.91%. Slightly below the 100 % of penetration rate is positioned Tajikistan (95.13%), Turkey (94.79%) and Iran (87.79%). In Afghanistan, Pakistan and Uzbekistan approximately 2/3 of the population are subscribed to mobile-cellular telephony.

In the ECO region the mobile-cellular markets are fiercely competitive with at least three mobile operators in each country (except Turkmenistan). All countries have now 3G mobile services. Commercial 4G/LTE services have been launched in major cities of Azerbaijan, Pakistan, Iran, Kyrgyzstan, Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan. In August 2015 Turkey's 4G spectrum auction took place, where Vodafone, Turkcell and Avea acquired spectrum for deployment of LTE networks. The licenses will be valid from 1 April 2016 till 30 April 2029.

Figure 2: **Mobile-cellular subscriptions per 100 inhabitants ECO 10 Countries**
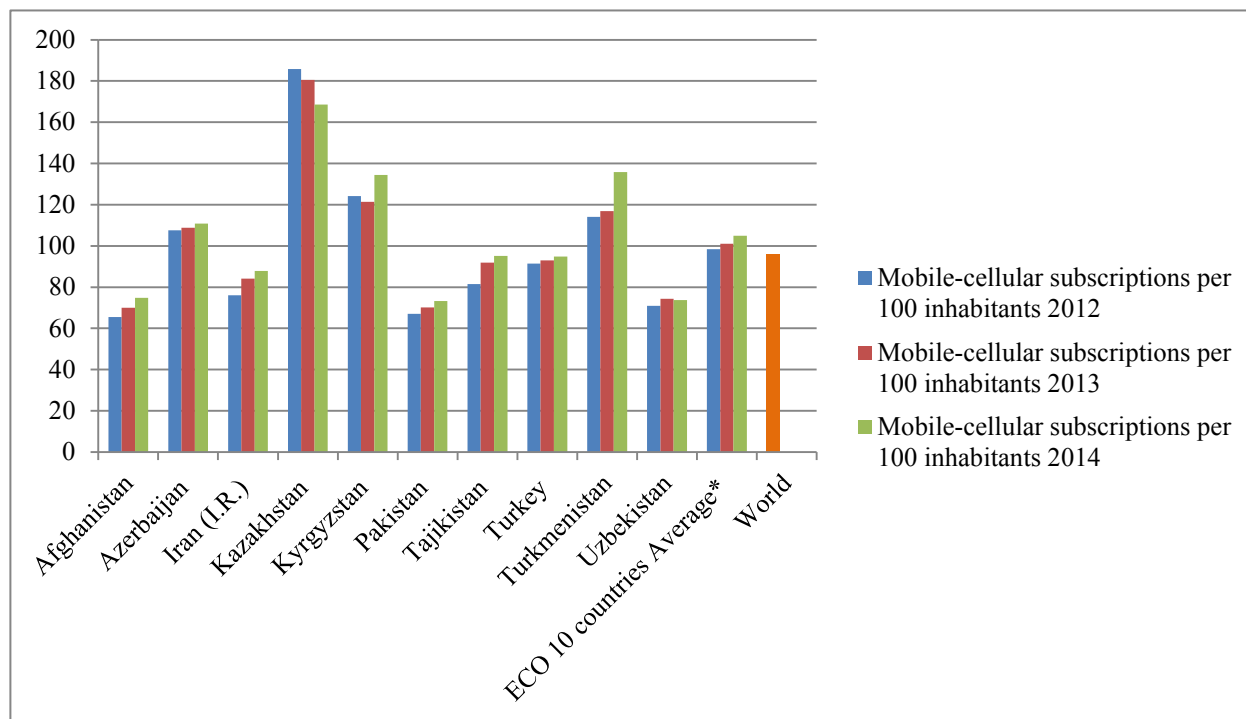
Fixed-telephone and mobile-cellular prices

Fixed telephony still remains the most widespread ICT service based on fixed (wired) telecommunication networks even if a decline was registered over the last decade in fixed-telephone subscriptions. By the end of 2013 the global fixed- telephone penetration represented 16% compared with 9% for the fixed (wired)-broadband penetration. The coverage gaps in the fixed-telephone network have been filled by the mobile-cellular network, which covers 93% of the global population.

The cost of a basic fixed-telephone service was on average USD 13.9 per month by the end of 2013, while the cost of a prepaid low-user mobile-cellular subscription was about USD 16.2 per month. This compares with an average of USD 31.9 per month for an entry-level fixed-broadband plan, and USD 19.5 per month for a prepaid mobile- broadband service with a 500 MB monthly data allowance. As a result the fixed-telephone and mobile-cellular prices are the cheapest among ICT services, suggesting that low prices have contributed to the widespread adoption of traditional voice and SMS services. Mobile-cellular services are very affordable in most developed countries, corresponding to less than 2% of GNI p.c. in the majority of them. In 2013 a basic fixed-telephone service had on average the cost of 1.0% of GNI per capita in developed countries compared with 5.2% in developing countries and thus voice services are less affordable in developing countries than in developed.

The Broadband Commission for Digital Development has set the affordability target for broadband prices to be less than 5% of monthly GNI p.c. by 2015. To better understand how much the price of a given ICT service represents for the user in each country, prices are also presented as a percentage of GNI p.c., so as to provide an insight into the affordability of fixed-telephone and mobile-cellular services from a demand-side perspective.

Table 2. Fixed-telephone basket, Mobile-cellular basket, 2013

Economy	Fixed-telephone prices as % of GNI p.c.	Fixed-telephone prices, USD	Mobile-cellular prices as % of GNI p.c.	Mobile-cellular prices, USD	GNI p.c., USD, 2013*
Afghanistan	2.78	1.62	10.07	5.87	700
Azerbaijan	0.42	2.55	1.71	10.49	7'350
Iran (I.R.)	0.03	0.12	0.46	2.23	5'780
Kazakhstan	0.50	4.76	1.15	10.91	11'380
Kyrgyzstan	1.30	1.30	5.42	5.42	1'200
Pakistan	4.27	4.91	3.17	3.65	1'380
Tajikistan	no	no	no	no	990
Turkey	1.32	12.03	2.91	26.52	10'950
Turkmenistan	no	no	no	no	6'880
Uzbekistan	0.62	0.97	1.82	2.89	1'900
ECO 10 countries Average*	1.12	2.83	2.67	6.80	845

The cheapest fixed-telephone prices and mobile-cellular prices in the region are in Iran, where the basic fixed-telephone services cost USD 0.12 per month and mobile-cellular services cost USD 2.23. Turkey has the most expensive fixed- telephone prices (USD 12.03) in the region, followed by Pakistan (USD 4.91).At the same time Turkey has a much higher GNI p.c. and therefore the services are more affordable.

More affordable fixed-telephone prices are in Iran (0.03% of GNI p.c.), followed by Azerbaijan (0.42% of GNI p.c.), Kazakhstan (0.50% of GNI p.c.) and Uzbekistan (0.62 per cent of GNI p.c.).

Pakistan (4.27 per cent of GNI p.c) and Afghanistan (2.78 per cent of GNI p.c.) have the less affordable fixed-telephone prices in the region, but other regional countries have affordable enough prices for fixed-telephone services.

Although the mobile-cellular prices in Turkey (USD 26.52), Kazakhstan (USD 10.91) and Azerbaijan (USD10.49) are high such services are affordable for the population due to a higher GNI p.c.

d) Internet

Internet access

43.6% of the world's households had Internet access at home in 2014. The same indicator in Europe represented 78% of households and the growth dynamics demonstrates a saturation of this market. The Asia and Pacific region boasts the highest number of households with Internet with close to 350 million by the end 2014. The penetration rates in the Asia and Pacific and Arab States regions are very close and respectively 35.9% and 36.0% which is below the global average and some two-thirds of the household in these regions are not yet connected to the Internet. The penetration rates in the Americas (57.4%) and CIS countries (53.0%) are higher than the world average. The only continent below the world average is Africa with 11% of households having access to Internet.

The household access to the Internet in the ECO region was 27.38% by the end of 2013 (see Figure 3) which is lower than the world's average. The most connected to the Internet are households in Kazakhstan (55.0%), followed by Azerbaijan (51.5%) and Turkey (49.1%). In Iran (35.8 per cent) slightly more than one-third of the households are connected to the Internet. Penetration rates of less than 10% are registered in Uzbekistan (9.5%), Pakistan (8.3%) and Kyrgyzstan (7.7%). Afghanistan has the lowest penetration rate in the region of 2.5%.

Figure 3: Household access to the Internet in the 10 ECO Countries
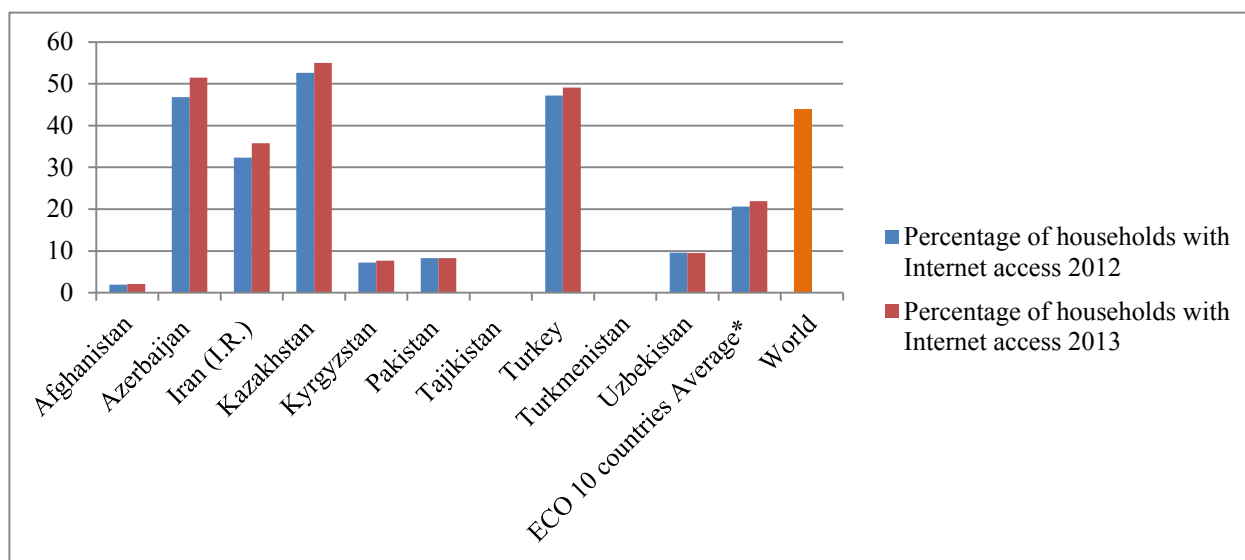
Fixed broadband

By 2014 the fixed-broadband subscriptions reached a total of 711 million globally, corresponding to a penetration rate of almost 10%. Europe's fixed-broadband penetration is much higher compared with other regions and almost three times as high as the global average: 27.7% and 9.8% respectively. The Arab States region stands out with a low fixed-broadband penetration of 3.1% by the end 2014, the Americas region displays the lowest growth in fixed broadband, estimated at 2.5% and reaching a penetration rate of around 17%. The CIS countries reach the penetration rate of 14.3%, but Asia and the Pacific stands out as a region registering relatively low fixed-broadband penetration (7.7%) and a sharp

decline in the growth of fixed broadband over the past four years. The lowest penetration rate is in Africa – 0.4 per cent[2]

In 2014 the fixed (wired)-broadband market in the ECO Member States had 22,968,725 subscribers, with an annual growth of around 3,200,000 during the last three years. The regional penetration was 6.03% growing by 1.7% compared to 2012. The fixed (wired)-broadband penetration rate in the 10 ECO countries compared to the world average is shown in Figure 4.

The fixed (wired)-broadband market in Afghanistan, Tajikistan, and Turkmenistan showed stagnation during the last 3 years with a respective penetration of 0.01%, 0.07% and 0.04%. Most of the subscribers of fixed (wired)-broadband in 2014 were in Turkey (8,866,361 subscribers) with a decrease of 27,030 subscribers as compared to 2013. In Iran the penetration rate was 9.46% that represents 7,425,807 subscribers. The number almost doubled since 2012.

The regional leader in terms of the level of the penetration rate is Azerbaijan with 19.83% which counts to 1,887,070 subscribers. Countries with the penetration rate higher than 10% are Kazakhstan (12.93%) and Turkey (11.69%). The penetration rate in Kyrgyzstan was 4.16%, while Uzbekistan and Pakistan were respectively 1.06% and 1.08%.

In Afghanistan the fixed-telephone and fixed (wired)-broadband markets are practically not developing. During the last three years the fixed-telephone penetration rate was 0.33%, while the fixed (wired)-broadband penetration rate - 0.01%. The penetration rate of the fixed (wired)-broadband in Turkmenistan (0.04%) and Tajikistan (0.07%) indicates that the market in these countries is still at an incipient level of development even though the existing fixed-telephone infrastructure allows a growth by at least 11.77% and 5.24% respectively. There is also a similar situation in Uzbekistan with a slightly higher annual penetration rate of the fixed (wired)-broadband of 1.0% and a fixed-telephone infrastructure that currently allows the development of the fixed (wired)-broadband up to 8.55%. The penetration rate in Pakistan for fixed-telephone, as well as for fixed (wired)-broadband is rather low with 2.65% and 1.08% respectively.

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[2] Measuring the Information Society Report 2014, ITU https://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf

Figure 4: Fixed (wired)-broadband penetration rate in the 10 ECO countries
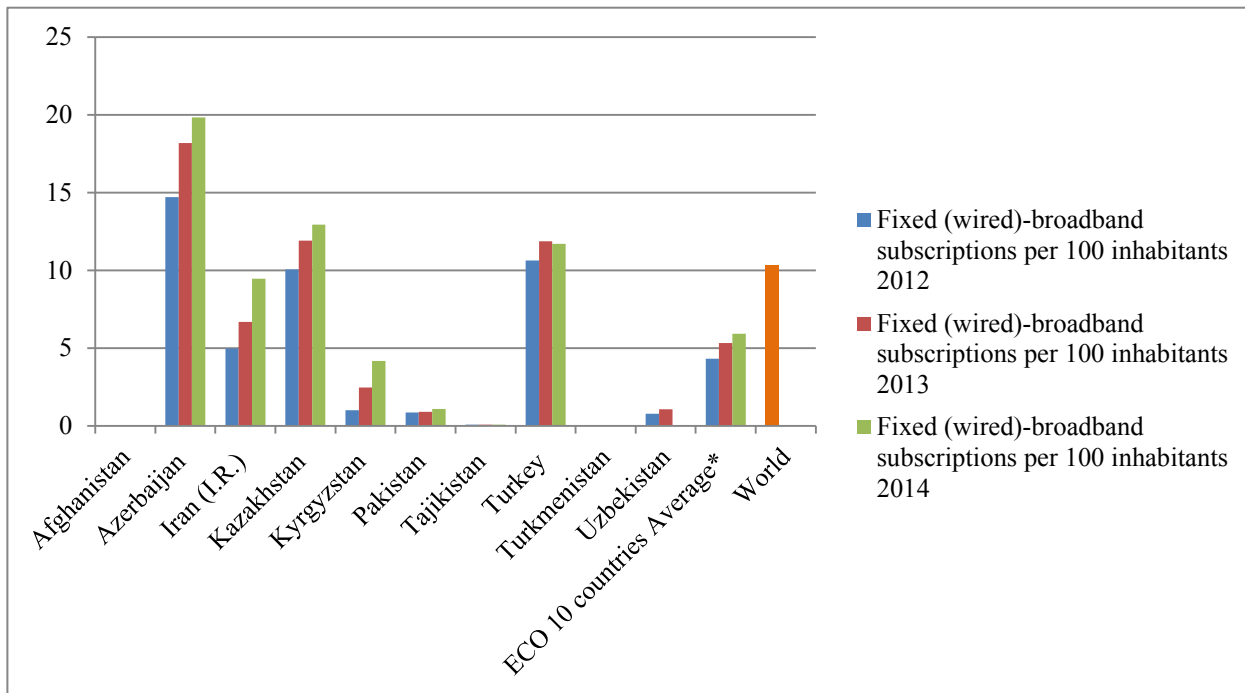
Kazakhstan and Kyrgyzstan have harnessed nearly 50% of the possibilities related to the fixed-telephone infrastructure (26.8% and 8.9% respectively) for offering fixed (wired)-broadband services (12.93% and 4.16% respectively). For the latter they demonstrate a slight annual growth by 1.5 - 1.7.

Iran has a fixed-telephone infrastructure quite well-developed, however, it has 4 times less subscribers for fixed (wired)-broadband services (9.46%) than for fixed-telephone services (38.98%). Still the penetration rate of the fixed (wired)-broadband is growing by 2.8% as compared with the previous year.

Azerbaijan has utilized completely the level of development of the fixed-telephone infrastructure (18.87%) in order to offer fixed (wired)-broadband services (19.83%). The 19.83% compared to the penetration rate of fixed-telephone services (18.87%) demonstrates that there is demand on the market for fixed (wired)-broadband services that must be satisfied by further developing the fixed (wired)-broadband infrastructure.

In 2014 the fixed-telephone and fixed (wired)-broadband markets in Turkey have slightly declined as compared with 2013 by 1.52% and 0.18% respectively. While during early 2015 the fixed (wired)-broadband market registered an insignificant increase by 0.21 % compared to 2014.

Mobile broadband

Over the past 15 years there was a shift from lower-speed to higher-speed mobile technologies. In developed countries 3G subscriptions overtook 2G subscriptions in 2010 and 3G growth is evening out. In developing countries a large majority of subscriptions are still 2G, however 3G is growing rapidly and will overtake 2G subscriptions in a few years. Given the strong growth in mobile-broadband subscriptions, more and more countries are deploying 3G+ technologies and services. 4G services came onto the market only recently and 4G subscriptions still account for only a small market share in both

developed and developing countries. Due of the limited fixed-broadband infrastructure and the lack of affordable fixed-broadband services in developing countries, mobile-broadband services are becoming an alternative to the fixed broadband. Mobile broadband remains the fastest growing market segment.

In 2014 the global penetration rate was 32% which is four times the penetration rate recorded just five years earlier. Mobile broadband is growing fastest in the developing countries, where the growth rates proved to be twice as high (26%) as in developed countries (11.5%). This is driven by the availability and uptake of more affordable devices (smartphones) and types of plans offered on the market. The divide between developed and developing countries remains huge: mobile-broadband penetration in Europe is 63.8%, Americas region – 59.1% and CIS -48.9%. The high penetration in developed countries is partly due to the very high uptake in the populous countries such as the United States and Japan, where penetration rates reached 93% and 120% respectively in 2013. Other regions have penetration rates lower than the global penetration: Arab States – 24.6%, Asia and Pacific – 22.8% and Africa – 19.0%.

In 2013 the average of mobile broadband penetration in the ECO Member States reached 18.4% with an increase by 4.34% compared to 2012 (see Figure 5). Generally, the penetration rate in the region differs from country to country. Kazakhstan denoted the highest penetration rate in 2013, which represents 56.6% that is 14.1% more compared to 2012. The second in the top was Azerbaijan with 45.1% penetration increasing by 15.6% compared to the previous year. These countries are followed by Turkey with 32.3 per cent and the penetration rate in Kyrgyzstan and Uzbekistan is almost 23 per cent. A level below 5 per cent is in Iran (2.5%), in Afghanistan (1.2%) and Pakistan (0.8%).

Figure 5: Mobile broadband penetration in the 10 ECO countries
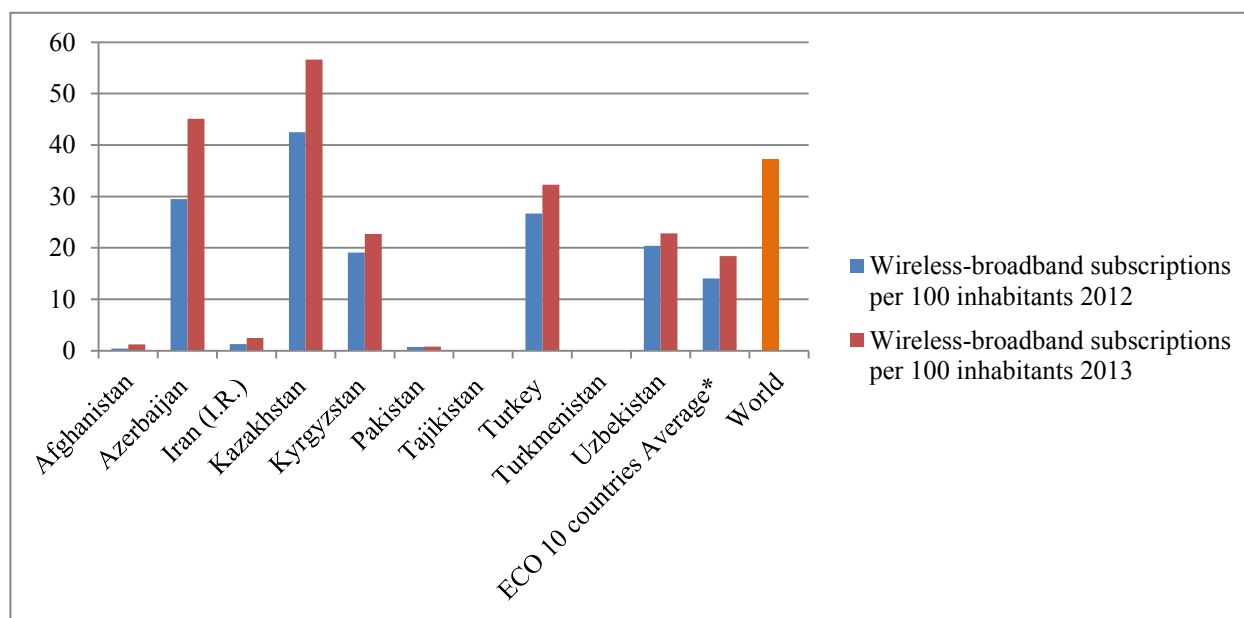
Fixed and mobile broadband prices

During 2008-2013, the price of an entry-level fixed-broadband plan decreased by almost 70% globally. Along with the drop in prices, there was a notable increase in the advertised speed for fixed-broadband plans: 256 kbit/s was the most common entry-level speed in 2008, compared with 1 Mbit/s in 2013.The affordability target set by the Broadband Commission for Digital Development states: "By 2015, entry-

level broadband services should be made affordable in developing countries through adequate regulation and market forces (amounting to less than 5% of average monthly income)" (Broadband Commission, 2011).

Table 3. Prices for fixed broadband basket, 2013

Economy	Fixed broadband prices as % of GNI p.c.	Fixed broadband prices, USD	Speed in Mbit/s	GNI p.c., USD, 2013*	ICT Price Basket as % of GNI p.c.
Afghanistan	38.61	22.52	0.25	700	17.2
Azerbaijan	2.08	12.75	1	7'350	1.4
Iran (I.R.)	1.24	5.97	0.256	5'780	0.6
Kazakhstan	1.34	12.69	1	11'380	1.0
Kyrgyzstan	11.89	11.89	0.5	1'200	6.2
Pakistan	10.70	12.30	1	1'380	6.0
Tajikistan	no	no	no	990	no
Turkey	1.26	11.50	1	10'950	1.8
Turkmenistan	no	no	no	6'880	no
Uzbekistan	5.14	8.14	0.26	1'900	2.5
ECO 10 countries Average*	7.23	9.78	0.53	845	3.67

Four ECO Member States (Azerbaijan, Iran, Kazakhstan and Turkey) have fixed-broadband prices that are at least 2, 5 times below the 5% affordability threshold. The cheapest fixed-broadband services in the region are in Iran with USD 5.97. Slightly above the threshold of 5% is Uzbekistan with 5.14% of GNI p.c. In Kyrgyzstan and Pakistan the fixed- broadband services are expensive and exceed more than 2 times the 5% level, while the least affordable fixed- broadband services in the region are in Afghanistan with 38.61% of GNI p.c.

The ICT Price Basket (IPB) presented in Table 3 includes end-2013 data for each of the three price sets contained in the IPB (fixed-telephone, mobile-cellular and fixed-broadband services).

Five ECO Member States fall within the level of affordable prices for ICT Basket. Kyrgyzstan and Pakistan exceed this level by 1%. In Afghanistan one should pay monthly 17.2% of GNI p.c. for covering the ICT Basket.

In the case of Uzbekistan, prices are relatively cheap (USD 8.1), but GNI per capita is very low. It is to be expected that the target will be met there by end 2015 if fixed-broadband prices are maintained and economic growth continues. However, policy and regulatory action will be necessary to step up a gear in broadband adoption, since fixed (wired)-broadband penetration in Uzbekistan stood at only 1.1 per cent at

the end of 2013. Limited international connectivity is one of the important bottlenecks to be addressed in the Uzbek broadband market, where there was only 20 000 Mbit/s of international Internet bandwidth to share among more than 300 000 fixed (wired)-broadband subscriptions in 2013. The scarcity of international Internet bandwidth is further confirmed by the fact that the entry-level plan in Uzbekistan is capped at 1.2 GB of usage per month, whereas in most CIS countries fixed- broadband plans allow unlimited usage. Future growth in broadband adoption would require an increase in international connectivity.

Mobile-broadband prices

Mobile-broadband prices vary and operators are continuously launching innovative offers to try to attract new customers. Besides the main types of mobile-broadband services, operators are adding plans for specific devices, such as tablets, MiFi dongles, BlackBerry, etc. In addition, handset-based mobile-broadband plans are often bundled with mobile voice and SMS. This makes it difficult to isolate the prices of mobile-broadband services, particularly for postpaid plans, where it is sometimes cheaper to buy a package including Internet, voice and SMS than to contract only Internet.

Table 4. Mobile-broadband prices, postpaid/ prepaid handset-based 500 MB, 2013

Economy	Mobile-broadband price as % of GNI p.c., postpaid	Mobile-broadband price, USD, postpaid	Mobile-broadband price as % of GNI p.c., prepaid	Mobile-broadband price, USD, prepaid	GNI p.c., USD, 2013*
Afghanistan	10.78	6.29	10.78	6.29	700
Azerbaijan	0.83	5.1	0.83	5.1	7'350
Iran (I.R.)	2.37	11.4	2.37	11.4	5'780
Kazakhstan	0.69	6.51	0.69	6.51	11'380
Kyrgyzstan	8.88	8.88	8.88	8.88	1'200
Pakistan	2.14	2.46	1.28	1.48	1'380
Tajikistan	17.01	14.03	17.01	14.03	990
Turkey	0.52	4.73	1.09	9.98	10'950
Turkmenistan	no	no	3.06	17.54	6'880
Uzbekistan	no	no	3.79	6.0	1'900
ECO 10 countries Average*	4.32	5.94	4.98	8.72	845

Table 5. Mobile-broadband prices, postpaid/prepaid computer-based 1 GB, 2013

Economy	Mobile-broadband	Mobile-broadband	Mobile-broadband	Mobile-broadband	GNI p.c., USD,

	price as % of GNI p.c., postpaid	price, USD, postpaid	price as % of GNI p.c., prepaid	price, USD, prepaid	2013*
Afghanistan	21.56	12.58	21.56	12.58	700
Azerbaijan	1.46	8.92	1.46	8.92	7'350
Iran (I.R.)	no	no	20.18	97.21	5'780
Kazakhstan	0.69	6.51	0.69	6.51	11'380
Kyrgyzstan	10.12	10.12	10.12	10.12	1'200
Pakistan	12.26	14.10	10.22	11.76	1'380
Tajikistan	17.01	14.03	17.01	14.03	990
Turkey	1.15	10.45	1.67	15.23	10'950
Turkmenistan	no	no	no	no	6'880
Uzbekistan	no	no	5.68	8.99	1'900
ECO 10 countries Average*	6.43	7.67	8.86	18.54	845

e) infrastructure development

In the ECO region Turkey has international Internet bandwidth per Internet user of more than 65 Kbps (see Table 6), as well as the most affordable prices for IP transit of $4 for high-volume of traffic. Turkey is followed by Kazakhstan with around 50 Kbps and Azerbaijan with 45 Kbps and respectively $15 and $20 for IP transit per Mbps per month. Bandwidth per Internet user in Afghanistan and Uzbekistan is very weak - 2.8 Kbps or less. Every user in Pakistan has 6.5 Kbps, while in Iran and Kyrgyzstan no more than 5.0 Kbps per user. Less affordable prices for IP transit other than in Azerbaijan are registered in Afghanistan ($35) and Iran ($58). Expensive prices are in landlocked countries such as Kyrgyzstan, Tajikistan and Turkmenistan and representing hundreds of dollars. In Kyrgyzstan and Tajikistan satellite bandwidth is cheaper than international fiber bandwidth. The direct access to cost-effective IP transit capacity is lacking in these countries.

Table 6. Access to International Internet Bandwidth in the ECO Member States

Country	International Internet Bandwidth	International Internet bandwidth Bit/s per Internet user, 2013	IP transit price, per Mbps per month, USD
Afghanistan	15 Gbps in 2015.	2'774	$35
Azerbaijan (LLDCs)	205 Gbps in 2012	45'243	$20
Iran	202 Gbps in 2015	4'632	$58
Kazakhstan (LLDCs)	290 Gbps in 2013	49'839	$15

Kyrgyzstan (LLDCs)	5 Gbps in 2012.	3'858	hundreds of dollars
Pakistan	576 Gbps in 2014	6'548	$100 for low-volume traffic $14 for high-volume traffic
Tajikistan (LLDCs)	3 Gbps in 2012	No	hundreds of dollars
Turkey	3.6 Tbps in 2014	65'516	$4 for high-volume traffic
Turkmenistan (LLDCs)	650 Mbps in 2012	No	hundreds of dollars
Uzbekistan (Double LLDCs)	15.5 Gbps in 2014	1'809	$347

International Internet bandwidth Bit/s per Internet user, 2013
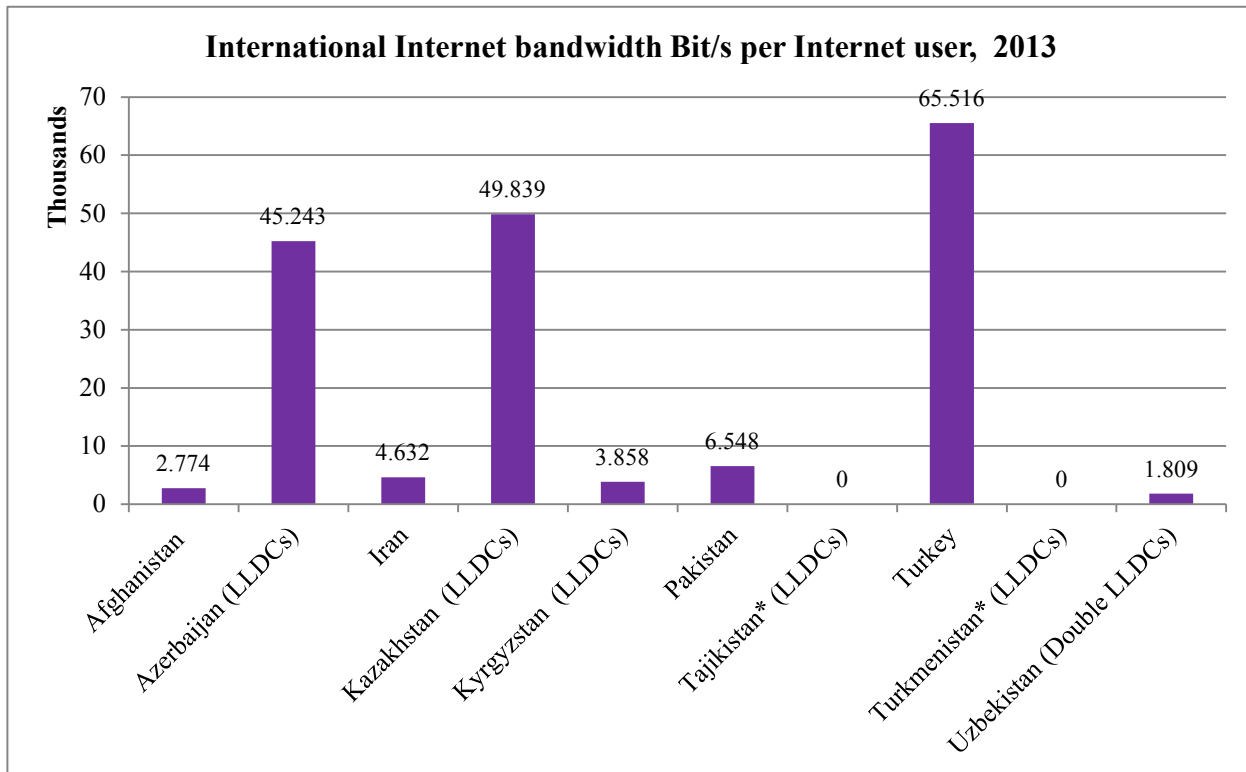
Note: *Tajikistan and Turkmenistan – no data.

A very expensive, amounting to $347, price for IP transit is in Uzbekistan, which is double than for other LLDCs. Kazakhstan and Azerbaijan are also landlocked countries, however they benefit for better prices for high-volume of traffic since their international Internet bandwidth is at least 40 times more than the international Internet bandwidth in Kyrgyzstan, Tajikistan and Turkmenistan. Beside Azerbaijan is integrated with multiple leading markets in the region, which allows decreasing the international bandwidth costs. Kazakhstan has also no direct access to intercontinental bandwidth, but due to the fact

that most of its traffic is directed toward the Russian Federation, having at least three border links with Russian Federation operators, the big volume of the international Internet bandwidth allows the country to benefit from low prices for IP transit.

The status on the development of competition on the fixed telephony, mobile telephony and Internet markets in the ECO Member States is shown in Table 7. While the description of these markets for each country is presented in Annex 1 "Country profiles".

Table 7. Competition on the ICT markets in ECO Member States

Country	Fixed telephony	Mobile	Internet	International
Afghanistan	Afghan Telecom Corporation government-owned & Wasei Telecom	2003 6 mobile operators 2G, 3G services CDMA	60 ISPs ADSL, Wi-Max	Afghan Telecom
Azerbaijan	Azertelecom government-owned & other - more than 8	8 mobile operators, 3G –from 2009 4G -from 2012 CDMA	more than 30 ISPs ADSL, FTTH, cable - modem	private ISP Delta Telecom Azertelecom
Iran	TCI	2003 5 mobile operators GSM, 3G, 4G	9 man ISPs	TIC
Kazakhstan	Kazakhtelecom – Government majority owned & 5	4 mobile operators. 3G – from 2010, 4G LTE - from 2013.	more than 10 ISPs ADSL, FTTH and Wi-Fi.	Kazakhtelecom
Kyrgyzstan	Kyrgyztelecom"- state ownership & 2 major suppliers	3 major mobile operators. GSM, CDMA 450, 3G, 4G LTE- from	more than 30 ISPs xDSL, FTTx, Wi-Fi WiMAX,	Kyrgyztelecom

		2011		
Pakistan	PTCL, Government majority-owned & 8	2004 5 mobile operators 3G –from 2014 4G –from 2014	5 main ISPs	PTCL, Transworld Associates
Tajikistan	Tajiktelecom & many services providers	9 mobile operators in CDMA 20001X, CDMA 450 WiMAX – from 2008, 4G LTE- from 2012	at least 10 ISPs	Tajiktelecom
Turkey	Turk Telekom & several providers	3 mobile operators 3G, 4G	422 ISPs and 6 of them offer services for 99.5% of subscribers xDSL, FTTH, FTTB, cable	Türk Telecom, Turkcell Superonline, MedNautilus
Turkmenistan	Turkmentelecom has monopoly	2mobile operators GPRS/EDGE 3G- from 2010 4G- from 2013	1 ISP Turkmenistan Online ADSL	Turkmentelecom
Uzbekistan	Uztelecom state-owned & 1 operator	4 mobile operators 3G- from 2008 4G- from 2010	7 ISPs xDSL and FTTH, FTTB	Uzbektelecom

Below is an overview of the national backbone networks and deployment of the internal fiber optic networks in the ECO Member States, as well as their international connectivity.

Afghanistan

The Afghan Optical Fiber Network consists of a backbone built along the country's circular Highway 1, also known as the Ring Road, with branches to other provinces and transborder connections to Pakistan,

Iran, Turkmenistan, Uzbekistan, and Tajikistan. Construction was begun in 2007 and 21 provincial capitals have been connected and made operational for broadband connectivity. Another 4 provinces will be connected with the Backbone Network in 2015-16, under the World Bank fund. Afghanistan needs (USD 40 Million) funds to connect the remaining 9 provinces.

Due to security issues, ring is not complete and gap exists in connectivity between Heraat and Maimana. For the moment ring has connected via Turkmenistan with capacity of 2 x STM-4 and will be upgraded to STM-64.

Afghanistan is connected to all of its neighbors via terrestrial fiber connections, with the exception of China. Afghanistan has dual fiber links to Pakistan and Turkmenistan, as well as links to Iran, Tajikistan, and Uzbekistan.

The country's international Internet bandwidth increased from 8 Gbps in 2013 to 15 Gbps in 2015.

IP transit was priced at $35 per Mbps per month as of year-end 2014, having fallen an average of 38% annually since 2004, when prices were $4,000 per Mbps.

Afghan Telecom offers unprotected international circuits to Pakistan for $120 per Mbps, to Iran for $170 per Mbps, and to Uzbekistan for $400 per Mbps.

Although the geographic coverage of Afghanistan's international connectivity is strong, with connections to all neighbors, the country has yet to implement a solution for high-volume, affordable international bandwidth.

Azerbaijan

Aztelecom's fiber optic cable network covers all major regions and cities of Azerbaijan, including Nakhchivan. It also connects Baku to borders on three major directions – northern to Russia, southern to Iran and western to Georgia and Turkey. The structure of the network is based on several rings unified into a single system. In 2012 the private ISPs Alfanet, Azeronline, Caspel, Data Plus, Premier Group, QTelecom, and Smart were installing a 420 km primarily rural fiber network.

As one of the tasks towards the diversification of economy and prioritization of ICT in Azerbaijan was an establishment of a modern aerospace industry and launch of national telecommunication satellite. In this respect, Azercosmos OSJCo was established in May 2010 and Azerspace-1, the first national telecommunication satellite, was launched in February 2013. Today Azerspace-1 is an important gateway in a joint space that connects more than 50 countries in Central Asia, Europe, Africa and Middle East and provides for broadcasting, data and telecommunications, both full time and flexible capacity lease, and teleport services. Later Azercosmos signed a strategic cooperation agreement with Airbus Defence and Space to take over the rights to operate and commercialize the SPOT 7 high resolution (1.5m imagery products) optical Earth observation satellite, which was successfully launched on June 30, 2014 and to be renamed as Azersky.

Trans-Asia Europe (TAE) Line constructed in 2001 provides connectivity to Georgia and Islamic Republic of Iran. International links to Russian Federation is served by four terrestrial fiber optic cables, interconnecting with MegaFon, Rostelecom, and TTK, provide the country's primary international bandwidth connectivity.

Nakhchivan Autonomous Republic (exclave) is linked to the rest of Azerbaijan via a fiber link through Iran and link is operated by the Telecommunications Infrastructure Company of Iran. Nakhchivan is linked to Turkey's Turk Telecom network.

The Europe Persia Express Gateway (EPEG) was implemented in 2013 and has end-to-end transit capacity of 500 Gbps, upgradeable to 3.2 Tbps.

Internet bandwidth grew by a factor of 20 between 2008 and 2012.In 2012 international Internet bandwidth was 205 Gbps. The majority of this traffic was transported by private ISP Delta Telecom, which is the primary provider of international IP transit. The price of IP transit bandwidth in Azerbaijan to be as low as USD$20 depending on volume and term commitments.

Fiber connectivity is not present on the border between Azerbaijan and Armenia. Azerbaijan's lack of oceanic coastline leaves it reliant on neighbors, particularly Russian Federation, for transit capacity; however, recent projects such as EPEG and planned projects such as TASIM and the Trans-Caspian Links could position the country as a transit hub for the region.

Telecommunications infrastructure of Azerbaijan is integrated with multiple leading markets in the region, including Russian Federation, Turkey, and Islamic Republic of Iran which permit to decrease its international bandwidth costs and has positioned the country as a regional transit hub.

Turkey

As of 3rd quarter of 2015 Turkey's total fiber deployment was 261,000 km. Turk Telekom operates the country's largest fibre network, at 206,000 km. Turkcell Superonline's internal network was considerably smaller at 29,000 km, but its fiber connectivity was increased following its 2014 purchase of Metronet. Vodafone Net's fiber network was increased from 6,000 km to 16,000 km.

The major international gateway operators in Turkey are the incumbent Türk Telecom, which controls most of the country's international bandwidth, Turkcell Superonline which has extensive terrestrial fiber network and Telecom Italia subsidiary MedNautilus which owns the country's primary submarine cable network.

International network connectivity is well developed in Turkey. The country has strong terrestrial fiber connectivity to each of its neighbors, with the exception of Armenia. Turk Telekom and Turkcell Superonline have fiber connectivity to Azerbaijan, Bulgaria, Georgia, Greece, Iraq and Syria. Turk Telekom has an interconnection with the network of Iran's TIC.

Turk Telekom is an investor in the SEA-ME-WE-3 submarine cable, which entered service in 1999 and offers a significantly lower capacity than subsequent Europe-to-Asia systems. Turk Telekom has also signed the Construction and Maintenance Agreement (C&MA) and become a full member of the SEA-ME-WE 5 submarine cable consortium, which is set to start operating at the end of 2016 by connecting 18 countries from Southeast Asia to Western Europe with an approximate length of 20,000 km.International connections are made also through regional submarine cable systems include KAFOS in the Black Sea, linking Turkey to Bulgaria and Romania, and the Turcyos-1 and Turcyos-2 cables to Cyprus.

Turkey's international bandwidth is robust representing 2. 91 Tbps as of the 3rd Quarter of 2014 and 4.03 Tbps as of the 3rd Quarter of 2015. Annual growth of the country's international capacity remains

above 60%, driven not only by its own internal requirements, but also its role as a transit hub for traffic from the Middle East and Asia.

IP transit costs approximately US$4 per Mbps per month for high-volume traffic. Due to the country's position as a transit hub for other markets in the region is expected that the international bandwidth will increase and will be necessary to ensure the continued growth of its international connectivity.

Turkey has no fiber connectivity with Armenia, which could substantially benefit both countries and the region. Turkey has sufficient access to European IP bandwidth through international terrestrial links, but lacks the diversity of submarine bandwidth infrastructure present in other European countries.

Pakistan

In 2012, the country's internal inter-city fibre network was approximately 20,000 km, with backbones deployed and operated by Link Direct, Multinet, PTCL and Wateen. As of 2014, the total deployment is approximately 25,000 km. In 2013 the country's Universal Service Fund was used to finance the deployment of 6,700 km of new fiber deployment to 102 tehsils (local administrative subdivisions). Fiber networks are operated by four competing entities, but the total length of network deployment is comparatively low.

A great part of Internet bandwidth in Pakistan is controlled by the incumbent operator, PTCL. PTCL is the Pakistani signatory to the SEA-ME-WE-3 (1999), SEA-ME-WE-4 (2005), and I-Me-We (2010) submarine cables, which land in Karachi, Pakistan and link to Europe and India.

In 2006, Private operator Transworld Associates, which is 51 %-owned by Orascom Telecom Media and Technology, activated the 1,274-km TW-1 submarine cable to Oman and the United Arab Emirates. As a result the country's international connectivity is as follows:

- PTCL via SEA-ME-WE-3: 95 STM-1s (14.7 Gbps)
- PTCL via SEA-ME-WE-4: 1,465 STM-1s (227.8 Gbps)
- PTCL via I-Me-We: 1,712 STM-1s (266.3 Gbps)
- Transworld Associates via TWA-1: 5 STM-64s + 3 STM-16s: (57.2 Gbps)
- Pakistan-Afghanistan Terrestrial: 1 STM-64 (10 Gbps)

In 2014 the total international bandwidth in Pakistan was 576 Gbps, with 88% of this capacity provided by the Pakistan Telecommunications Company, Ltd. (PTCL) via its three submarine cables (SEA-ME-WE-3, SEA-ME-WE-4, and I-Me-We) and the remaining 12% provided by the Transworld Associates' TW-1 submarine cable and terrestrial links.

IP transit price is US$100 per Mbps per month for low-volume traffic and US$14 per Mbps per month for high-volume traffic.

Pakistan is one of the largest countries without an internal Internet exchange, making it extremely reliant upon international bandwidth. Pakistan has the diversity of submarine bandwidth infrastructure.

Iran

In 2012 the Telecommunications Infrastructure Company of Iran' (TIC) national backbone network was 47,000 km in length and its metropolitan fiber deployment totaled an additional 83,473 km, for a total of more than 130,000 km. The operator continued investment in its network in 2013 and 2014, so that total deployment is now estimated at between 150,000 and 200,000 km.

Iran has terrestrial links with all of its neighbors, except Pakistan, and with six submarine cables. Telecommunications Infrastructure Company (TIC) owned by Government was created in 2005 to manage Iran's international bandwidth infrastructure.

Iran has links with the next submarine cables: United Arab Emirates- Iran bilateral cable, length 170-km; Iran-Kuwait submarine system, a 330-km branched network connecting Bandar Ganaveh, Iran to Kuwait; Global Cloud Xchange's Falcon cable, which connects Egypt, the Middle East, Iran and India; the GBI cable, connecting the Mediterranean, the Middle East and India; the Pishgaman Oman- Iran submarine cable; The Europe-Persia Express Gateway (EPEG): Iran-Oman submarine cable, which forms part of a 10,000-km network from Germany to Oman.

In 2012 the capacities of border gateways were 1.4 Gbps with Armenia, 1.2 Gbps with Azerbaijan, 600 Mbps Turkey, 600 Mbps Turkmenistan, 300 Mbps Iraq and 200 Mbps Afghanistan. From its neighboring countries only with Pakistan has no fiber link. There are multiple fiber links between Iran and Turkey, and TIC has set a target of 1.1 Tbps of bandwidth across the countries' border by 2017.

Iran participates in two multinational terrestrial networks: Trans Asia-Europe and EPEG. Trans Asia-Europe network with 27,000-km, entered service between 1998 and 2001, includes trans-border segments at Bajgiran, Iran (between Bonjurd, Islamic Republic of Iran and Ashgabat, Turkmenistan) in the east and between Aslanik, Iran and Albayrak, Turkey in the west. Its Iranian point of presence is in Tehran. The 10,000-km EPEG fiber optic network, connecting Germany to Oman, was conceived in 2011, at least partly as a response to obstacles faced by the consortium-owned EIG submarine cable in activating connectivity across Egypt. The network was activated in 2013.

Iran's international bandwidth increased dramatically from 2013. In 2013 the country's international Internet bandwidth was 113 Gbps and in middle of 2015 was 202 Gbps. International bandwidth price is US$58 per Mbps per month.

Kazakhstan

Kazakhtelecom operates fiber optic network consisting of a ring between Astana and population centers along the country's borders, as well as a north-south trunk connecting the country's interior between Astana and Almaty and spurs to secondary cities.

Transtelecom operates Kazakhstan's national rail company fiber network. VimpelCom and its subsidiary TNS-Plus operate an 11,970 kilometer fiber optic network.

Although Kazakhstan has not direct access to intercontinental bandwidth, it has interconnection with the networks of many regional operators. From 1998 Trans Asia-Europe Line (TAE) segments of 1,500 kilometers within the country territory are connecting Kazakhstan to China, Kyrgyzstan, and Uzbekistan. The Kazakhstan segments are owned and operated by Kazakhtelecom, The initial capacity of the segments was 622 Mbits. In addition to the TAE link, there are separate links to Kyrgyzstan, Uzbekistan, and China.

Kazakhstan has at least three border links with Russian Federation operators, offering interconnection with the fiber networks of Rostelecom, VimpelCom, TTK, and Megafon. A 220 kilometers link to Turkmenistan was completed in 2013.

As of May 2013 Kazakhtelecom international capacity was 290 Gbps. Most demand is directed towards the Russian Federation: Russian language content accounts for between 85 and 94 % of all Internet usage in Kazakhstan. IP transit in Kazakhstan costed USD$15 per Mbps per month as of end 2012.

Kyrgyzstan

The Kyrgyztelecom fiber optic network connects major population centers, but its capacity is low and connectivity is limited elsewhere, including the sparsely-populated southeast. Kyrgyztelecom's fiber optic network was enlarged around its Trans Asia Europe (TAE) Line segments, initially activated in 2000. The two TAE segments were subsequently complemented by fiber to the borders of Tajikistan and Uzbekistan . A 265-kilometer link was constructed from the border with China to the border with Uzbekistan. A 308-kilometer fiber link between Bishkek and Talas was activated in January of 2013, operating at 1 Gbps and forming part of the Bishkek-Osh-Batken fiber backbone. Kyrgyztelecom was expected to activate a major north-south fiber link (via Jalal-Abad and Bishkek). In addition to its fiber backbone, Kyrgyztelecom also operates a national microwave network that was upgraded to 622 Mbps in 2009.

Kyrgyzstan has fiber connectivity across each of its borders, including the mountainous Chinese border. Kyrgyzstan was linked to the Trans Asia-Europe Line in 2000 and connectivity was made via a ring linking to Kazakhstan, which was supplemented with a redundant segment in 2007. Links which connect Kyrgyzstan to Tajikistan and Uzbekistan were constructed in 2009. ISP Elcat installed a fiber network in 2013 that interconnects Kyrgyzstan with China, Kazakhstan, and Tajikistan. Kyrgyztelecom constructed its own link to China but China Telecom refused to interconnect with the network due to technical concerns.

Kyrgyzstan's international Internet bandwidth was 5 Gbps at the end 2012. IP transit in Kyrgyzstan is estimated to cost hundreds of dollars per Mbps per month: satellite bandwidth is cheaper than international fiber bandwidth.

The country's international traffic passes mostly via Kazakhstan. Although Kyrgyzstan has international links with his neighbors, it lacks direct access to cost-effective IP transit capacity.

Tajikistan

The Tajiktelecom internal fiber optic network is concentrated primarily in the west of the country, with a backbone connecting Khujand in the north, southward to Dushanbe, Qurgonteppa, and Kulob, with radial fiber networks emanating from each city. An eastern segment connects to Murghab. The fiber network in Tajikistan is limited in its capacity and connectivity.

Tajikistan has trans-border fiber optic links to Afghanistan, Kyrgyzstan, and Uzbekistan. As of 2009 a link to China was also under implementation. Tajikistan - Kyrgyzstan link is 870 km length and was constructed by Tajiktelecom and Kyrgyztelecom in 2009 and a second link was constructed by ISP Elcat, which installed a fiber network in 2013 that interconnects Tajikistan with China and Kazakhstan. Tajikistan-Uzbekistan one link is 1,161 km length constructed in 2009 (bilateral redundancy is required).

IP transit in Tajikistan is estimated to cost hundreds of dollars per Mbps per month. Thus it becomes cheaper to purchase satellite bandwidth than to purchase international fiber bandwidth. There are no official data on Tajikistan international Internet bandwidth, but according to the estimation it was 2 to 3 Gbps in 2012.

Tajikistan has fiber across at least three of its four borders, but unfortunately none of the bordering markets offers access to affordable IP transit bandwidth.

Turkmenistan

The Trans Asia-Europe Line was activated in 1998, connecting Turkmenistan to Iran and Uzbekistan.Turkmenistan has proposed an additional link to Uzbekistan. Turkmentelecom and Kazakhtelecom installed a link to Kazakhstan in 2013. Two links to Afghanistan are reportedly under construction, and an additional link to Uzbekistan has been proposed. Construction of the Trans Caspian Link submarine cable between Azerbaijan and Turkmenistan is uncertain and will likely depend on relations between the two countries.

Although trans-border links to each of Turkmenistan's neighbors are in service or under construction, the capacity and robustness of the links is weak.

The Turkmentelecom network is currently of relatively low capacity and connectivity. The initial Trans Asia-Europe (TAE) Line fiber network was 700 kilometers in length from the Iranian border to the Uzbekistan border. It represented the foundation of Turkmentelecom's domestic fiber optic connectivity; additional TAE deployment comprised a 600 kilometer link that connected Ashgabat to Turkmenbashi was constructed westward toward the Caspian Sea region.

The country's international Internet bandwidth was 650 Mbps as of end 2012. IP transit in Turkmenistan is estimated to cost hundreds of dollars per Mbps per month and is very expensive.

Uzbekistan

More than 13,000 kilometers of fiber optic and microwave lines were installed in the country. In 2010 Uztelecom's fiber network totaled 1,900 kilometers and 3,300 kilometers in 2011. In 2014 the construction of more than 2,000 km of fiber-optic lines for broadband access has been carried out in six districts with the provision of convergent services.

In 2005 Uztelecom deployed 261 kilometers of fiber optic cable in the autonomous region of Karakalpakstan with assistance from the Japanese Bank for International Cooperation, which provided an $18 million credit. Uztelecom's fiber network, while expanding, is still limited in capacity and connectivity.

Trans-Asia Europe Line segments connect Uzbekistan to Kazakhstan and Turkmenistan. Two additional diverse links to Kazakhstan, as well as links to Kyrgyzstan, Tajikistan, and Afghanistan were activated in 2009. Turkmenistan has proposed an additional link to Uzbekistan.

At the end of 2014 the international Internet bandwidth was 15.5 Gbps. The capacity of Uzbektelecom's international packet communication center was increased to 40 Gbps, and is planned to increase its international bandwidth to 100 Gbps.

The price of IP transit in Uzbekistan has fallen dramatically in recent years, but still remains among the most expensive in the world. As of 2010 Uztelecom's international IP transit was priced at USD$1,510 per Mbps per month; it halved to $705 in mid-2011 and then lowered to $529 at the end of 2011. By year-end 2012 the price was $422. Further cuts brought the price to $347 in August 2013. Tariff for Internet operators and service providers connected to the International Packet Switching Center has been reduced to 276 USD for 1 Mbps, which is 11.6% less in comparison with the beginning of 2014.

With Liechtenstein, Uzbekistan is one of only two "doubly-landlocked" countries in the world (i.e. surrounded by landlocked countries); consequently, the country is extremely reliant on terrestrial transit bandwidth. This makes the country's access to affordable international bandwidth extremely challenging.

Uzbekistan is linked to each of its neighbors, but it lacks direct access to cost-effective IP transit.

Internet Exchange Points in the ECO region

IXPs are an element of physical infrastructures for the exchange of traffic between Internet service providers (ISPs) and other content providers. As countries develop their digital infrastructure, IXPs are used to route domestic traffic exclusively within the country or region without needing to exchange data through international carriers.

The density of IXPs varies greatly by region. According to the information from Packet Clearing House (https://prefix.pch.net/) in 2015 out of 451 IXPs in the world, African ISPs have established only 37 and Latin American ISPs - 60. There are substantial areas, like northern Africa, where the IXPs are only few. In fact, 84 countries and territories presently have no IXPs. By contrast, European ISPs have established 173 and North American ISPs have established 96*. The density of IXP world location is showed in Figure 6. By failing to establish an IXP, the ISP disadvantages itself, and consequently spends more money than necessary.

In ECO region are established 12 IXP in seven countries (Afghanistan, Iran, Kazakhstan, Pakistan, Tajikistan, Turkey, Uzbekistan) from which 4 IXP are active in Iran, Pakistan, Turkey and Uzbekistan (see Table 8 below) and they serve 54 participants (ISPs).

Figure 6. IXPs Location in the World

*Note: Packet Clearing House, Report on Internet Exchange Point Locations;
https://prefix.pch.net/applications/ixpdir/summary/

Table 8. Active IXP in ECO Region

Country**	City	Internet Exchange Name	Participants/Traffic	Established
Iran	Tehran	Tehran IXP	6	Oct 2014
Turkey	Istanbul	Terremark IST-IX	8	2010
Pakistan	Karachi	Zero Point Internet Exchange	4/3.6M	10 Jan 2011
Uzbekistan	Tashkent	Uzbekistan Internet Exchange	36	24 Dec 2004

Source: Internet exchange point statistics from https://prefix.pch.net/applications/ixpdir/

3.2.Information society services

The opportunities offered by the digital development in the recent years, whether through online services, big data, social media, mobile apps, or cloud computing, are expanding the way we look at e-government.

Many countries have employed ICT in areas such as entrepreneurship, innovation, research and development, promoting distance learning, e-health, e-agriculture, e-trade and other fields. Accessing these new technologies for development is being recognized as one of the key sources of economic growth.

The responsible authorities for the development of information society in the ECO Member States usually are the Governmental Commission/Board on information society and/or sectorial ministry.

In Afghanistan the Ministry of Communications and Information Technology (MCIT) is responsible for the implementation and development of the information society.

In Azerbaijan the Ministry of Communications and High Technologies is the responsible body on information society, satellite infrastructure, high and innovative technology policy, e-government implementation and preparation of information technology strategy. To ensure the transition to information society, giving access to a large population in public services and reducing "digital divide" among population in rural areas an Action Plan was initiated in 2010.

In Turkey the Ministry of Development coordinates and monitors the Information Society Strategy and Action Plan and is also responsible for preparing Information Society Policies, objectives and strategies, public investment programs and allocating funds to projects of the central administration institutions. The Ministry of Development is drafting guidelines on the assessment and evaluation of public ICT projects made mandatory for all supervised activities. The Ministry of Transport, Communication and Maritime Affairs is responsible for preparing and implementing the e-Government Strategy and Action Plan in coordination with the information society strategy prepared by the Ministry of Development, as well as coordination and monitoring. There is an e-government portal "www.edevlet.gov.tr" to inform the stakeholders and people concerned about e-government in Turkey and developed documents on e-government.

The Ministry of Information Technology of Pakistan, through the National Information Technology Board (NITB) is the authority which deals with the information society development.

E-Government Development Index (EGDI) for ECO Member states[3]

E-government includes electronic interactions of three types—i.e. government-to-government (G2G); government-to-business (G2B); and government-to-consumer (G2C)—a more holistic and multi-stakeholder approach is taking shape.

New ICT networks and platforms being developed by both public and private sectors are dramatically changing business models and public service delivery. Countries continue to make significant investments in the public sector and these efforts are vital to achieving broad public participation in decision-making, enhancing access to information and removing barriers to public service. Through innovation and e-government, public administrations can be more efficient, provide better services and respond to demands for transparency and accountability. E-government can help governments go green and promote effective natural resource management, as well as stimulate economic growth and promote social inclusion.

E-government development is based on three dimensions: (i) the availability of online services, (ii) telecommunication infrastructure and (iii) human capacity and the EGDI which is a composite measure of these three important dimensions of e-government.

The new edition of the United Nations E-Government Survey was published in 2014. The United Nations E-Government Survey is produced every two years by the Department of Economic and Social Affairs of the United Nations. It is the only report in the world that assesses the e-government development status of the 193 United Nations Member States and serves as a tool for the decision-makers to identify their areas of strength and challenges in e-government and provide guidance on the e-government policies and strategies.

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[3] Benchmark the level of the ICT development in ECO Member States with other regions and the whole world

The data for this section were taken from the United Nations E-Government Survey (2014), except the data for the ECO 10 countries calculated by the author representing the simple average.

In order to determine the level of the e-government development by the EGDI, the United Nations E-Government Survey establishes four groups that reflect four different levels of ICT development: high, upper, medium and low. Very High EGDI: more than 0.75; High EGDI: between 0.50 and 0.75; Middle EGDI: between 0.25 and 0.50; Low EGDI: less than 0.25.

Table 9 and Figure 7 show the EGDI values and its three components (online service, telecommunications infrastructure and human capital) for the ECO Member States, their global ranks for 2012 and 2013, the level of development and the ECO regional EGDI average.

Figure 7: EGDI and its components in the ECO Countries
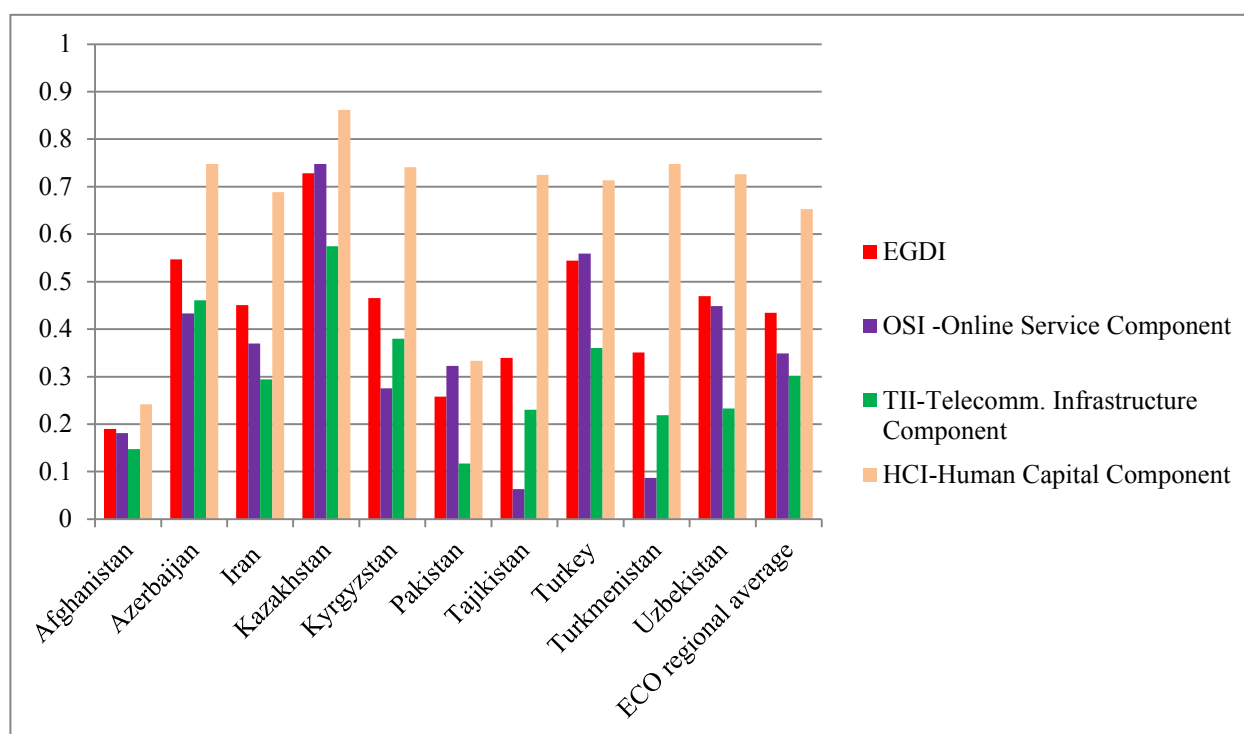
Table 9. EGDI and its components in the ECO Countries

Rank 2014/ Rank 2012	Country	EGDI	Online Service Component	Telecomm. Infrastructure Component	Human Capital Component
173	Afghanistan	0.1900/ Low	0.1811	0.1472	0.2418
68/ 96	Azerbaijan	0.5472/ High	0.4331	0.4605	0.7480
105	Iran	0.4508/ Middle	0.3701	0.2940	0.6882
28/ 38	Kazakhstan	0.7283/ High	0.7480	0.5749	0.8619
101/ 99	Kyrgyzstan	0.4657/ Middle	0.2756	0.3801	0.7413

158	Pakistan	0.2580/ Middle	0.3228	0.1174	0.3337
129	Tajikistan	0.3395/ Middle	0.0630	0.2306	0.7249
71/ 80	Turkey	0.5443/ High	0.5591	0.3605	0.7133
128	Turkmenistan	0.3511/ Middle	0.0866	0.2189	0.7478
100/ 91	Uzbekistan	0.4695/ Middle	0.4488	0.2333	0.7264
	ECO regional average*	0.4344 /Middle	0.3488	0.3017	0.6527

Note: *Simple averages. Expert calculations. Source: ITU

Kazakhstan is the highest-ranked country which went up 10 places to the 28th global position in 2014. It remains the ECO region's leader in e-government, with the EGDI value of 0.7283, followed by Azerbaijan (0.5472) and Turkey (0.5443). Azerbaijan improved its rank by 28 places, which is clearly the biggest jump in the region and is situated at the 68th position globally. Turkey improved its ranking by 9 places and is now ranked the third in the ECO region and 71st position globally. Uzbekistan dropped from the 91st place to 100th globally. A decline in ranking was also registered in Kyrgyzstan from 99th place to 101st.

E-government development remains very low in Afghanistan with the EGDI being 0.1900. This country suffered from a long war that destroyed the country's telecommunication infrastructure, not allowing developing new technologies and services, as well as human capital. Afghanistan and Pakistan are still located in the lower half of the ranking, reflecting the divide between these countries and the leaders of the ECO region.

The other countries in the ECO region are positioned between the 100th place (Uzbekistan) to 129th (Tajikistan) in the global ranking. This could be attributed to insufficient development of telecommunication infrastructure or/and online presence.

Online service delivery

There are four stages of online service development: stage 1 corresponds to emerging information services; stage 2 - enhanced information services; stage 3 - transactional services; and stage 4 - connected services.

According to the United Nations E-Government Survey only in 2014 all the UN Member States have for the first time had national websites. However, the majority of them remain at the low or intermediate levels of e-government development that corresponds to stage 1 and 2. At the same time there are difficulties faced by the countries with highly advanced ICT infrastructures and human resources. They are not able to move to the higher stages with transactional and connected services, since these normally would require a more solid data protection and online payment systems, as well as secure data sharing across government institutions. Only about half of the UN Member States maintain an advanced search engine, 40 per cent enable user opinion features, such as tag clouds and 'hot topics' lists, and less than one third show the availability of a secure connection.

Kazakhstan registered improvements at all four stages of online service development and has made great progress regarding the OSI value comparable to those of European countries. Good results are also visible in Turkey, Uzbekistan and Azerbaijan. Iran, Pakistan and Kyrgyzstan have made progress in developing Stage 1 and 2 of the Government websites and now should focus on developing Stage 3 and 4.

During 2010 Uzbekistan, Kyrgyzstan and Tajikistan have all improved their national and ministry websites. Among the national portals, Kyrgyzstan received the highest ranking in the region. The national portal includes transactional aspects and is strong on citizen engagement.

 Tajikistan, Turkmenistan and Afghanistan should improve the value of the OSI by developing Government websites which is now at Stage 1 with a level of development around 30- 40 per cent.

Telecommunication Infrastructure Index

The Telecommunication infrastructure Index is a complex one and includes five components. Data on the Telecommunication Infrastructure Indicator and its components for the ECO Member States are provided in Table 10.

Table 10. ECO Countries Telecommunications Infrastructure Indicator and its components

Country	Telecomm. Infrastructure Indicator	Percentage of Individuals using the Internet	Fixed-telephone subscriptions per 100 inhabitants	Mobile-cellular telephone subscriptions per 100 inhabitants	Fixed (wired)-broadband subscriptions per 100 inhabitants	Wireless broadband subscriptions per 100 inhabitants
Afghanistan	0.1472	5.45	0.05	60.35	0.00	28.73
Azerbaijan	0.4605	54.20	18.62	108.77	13.97	34.84
Iran	0.2940	26.00	37.63	76.10	4.03	1.34
Kazakhstan	0.5749	53.32	26.67	176.58	9.78	42.27
Kyrgyzstan	0.3801	21.72	8.93	124.18	2.61	59.63
Pakistan	0.1174	9.96	3.24	67.06	0.52	0.66
Tajikistan	0.2306	14.51	4.91	81.51	0.07	37.41
Turkey	0.3605	45.13	18.73	91.46	10.62	16.45
Turkmenistan	0.2189	7.20	11.12	76.42	0.03	33.05
Uzbekistan	0.2333	36.52	6.88	71.03	0.71	20.36

The ECO regional average of the Telecommunication Infrastructure Index is 0.3017. Individuals using the Internet in Afghanistan, Turkmenistan and Pakistan are below 10%, the fixed-telephone penetration is very low in Afghanistan (0.05 %), slightly higher in Pakistan (3.24%) and Tajikistan (4.91%). The fixed-telephony penetration in Uzbekistan is around 7% and in Kyrgyzstan is around 9%. The fixed broadband is least developed in the ECO region, where in three countries (Afghanistan, Tajikistan, Turkmenistan)

this market virtually does not exist, while in Pakistan and Uzbekistan the penetration rate is below 1%. Wireless broadband is at an incipient level of development in Iran (1.34%) and Pakistan (0.66%).

Due to these undeveloped or low developed segments of the ICT market in the ECO countries, the Telecommunication Infrastructure Index in Pakistan and Afghanistan is very low 0.1174 and 0.1472 respectively. The same Index in Iran is about 0.3, while in Uzbekistan, Tajikistan and Turkmenistan is almost 0.23. The leaders in the ECO region are Kazakhstan (0.5749) and Azerbaijan (0.4605), followed by Kyrgyzstan (0.3801) and Turkey (0.3605).

Human Capital Index

Kazakhstan has a very high level of Human Capital Index with an average of 0.8619, while the rest of the ECO countries have an index oscillating around 0.70, except for Afghanistan and Pakistan where this index is about 0.20 or 0.30.

Afghanistan and Pakistan having the lowest EGDI in the region need to build the human capital, including ICT literacy, develop the infrastructure for a favorable environment for the e-government development and improve the online service component.

a) e/m-Governance services

From the inclusive, sustainable development perspective, e-service delivery across multiple channels is important, particularly as offline service channels continue to be relevant around the world. Some governments include a range of service channels, including telephone, video or face-to-face interactions as part of their plan to move their services online.

Mobile phones are becoming the most rapidly adopted technology and the most popular and widespread personal technology in the world. Mobile government (m-government), as one of the channels in multiservice delivery, has tremendous benefits for public agencies. M-government is crucial in expanding the number of users and diversifying the channels for e-government service delivery.

The national government portal www.afghanistan.af was launched in 2010. There are 160 websites of the public administration authorities in 34 provinces. The national portal provides links to the ministries 'websites and key government resources. Most of the Government websites provide information to G2C and G2B. The more important e-Government services are designed to get the information on policies and laws, obtaining/filling in some forms. Some of the basic information on e-Government services is available through Internet, as well as mobile communication devices. The paperless administration has not been implemented yet at the level of public authorities.

Afghanistan National Data Center (ANDC) is a government data center and its main objective is to provide data center services to the Government of Afghanistan and be a platform for various ICT applications and systems under the e-Government and m-Government programs of MCIT.

The e-Government project in Azerbaijan was structured in accordance with the "National Strategy on Information-Communication Technologies for the Development of the Republic of Azerbaijan (2003-2012)" and implemented in the framework of the e-Azerbaijan Program. In view of the wide use of information communications technologies, the project envisages increasing the rationality and optimality

of the activity of state agencies aimed at simplifying relations with population and business, which contributes to better relations, transparency and access to the information.

According to the Presidential Decree No. 813 as of 2013 on the "Approval of Regulations of "E-government" portal and measures related to the expansion of e-services" and Decision No. 191 of the Council of Ministers as of 2011 on the "Rules of electronic services of the central executive bodies in specific areas" and "List of Electronic Services", 422 of e-services were integrated into the government portal – www.e-gov.az by 2016. On May 1, 2014 the Cabinet of Ministers approved the list of information systems and resources integrated into the e-Government portal and also technical feasibility requirements for further integration. At the same time the government reforms in e-government implementation led to the fact that public agencies have to register 80 state information resources and 170 personal data information systems in the country by 2016. The approval of the list of information systems and resources to connect the e-Government portal enabled to develop relations among public institutions in order to raise the efficiency of state authorities and promote transparency.

In Turkey increasingly the use of ICT tools and applications is leading to transformational shifts in public policy, processes and functions. E-government is being deployed not only to provide citizen services but for public sector efficiency purposes, improving transparency and accountability in government functions and allowing for cost savings in government administration. ICTs are changing the way the government does business for the people. In this context, e-government is seen to be a lever for the transformation of government.

Access to the e-Government services and information is ensured through the national government portal "e-Devlet Kapisi". The Turkish e-Government Gateway, was launched on 18 December, 2008 and provides links to the ministries' websites and key government resources. As of February 2016, the e-Government Gateway provides 1.416 services from 218 different agencies for 26.6 million registered users.

Most important G2C Transactional services are: Open Court Cases; Criminal Record Document; Registration of Self-Imported Cell Phones; Debt/Credit Query from Telecom Operators; Workers Union Registration/Resignation; License Plate / Driver Penalty Points Query; Tax Debt Query; Social Security Premiums Statement; Student Certificate.

Most important G2C Participation services are: "BIMER" Application (Prime Minister's Communication Centre; used for reporting concerns about public officials, institutions and policy changes.); Write to the President (Used for reporting concerns about the matters which the President is responsible for); Turkish Grand National Assembly e-Petition (Used for reporting concerns about policy changes).

Most important G2B Transactional services are: Patent and Trademark Application (TPE); e-Procurement Service (e-DMO); Social Security Premiums System (e-SGK).

The Turkish e-Government Gateway is available on mobile devices as a dedicated App. There are also kiosks located in public places, such as airports and train stations. Currently, there are no Integrated Service Centers.

All government agencies are connected to broadband Internet via fiber or ADSL connections. In remote areas satellite connections are also available. All basic databases required to provide new e-Government services G2C & G2B and public information electronically have been implemented. Paperless

administration is partially implemented; in numerous agencies are now used electronic document systems and electronic signatures. However, the transformation is not widespread.

In Pakistan the national government portal www.pakistan.gov.pk was launched in 2002. The websites of the central public administration authorities (ministries) are created and the national government portal provides links to them and to key government resources. The most important e-Government services are: e-Filing of Tax Returns for Federal Board of Revenue and the Recruitment System of Federal Service Commission. All central and local public administrations are connected to broadband Internet. Paperless administration is implemented only in few departments, however, work is in progress to cover all ministries in the near future.

The e-Government services are available through the many types of access such as Internet, kiosks, Integrated Service Centers, mobile communication devices.

Kazakhstan's egov.kz Portal was launched on 12April 2006 to facilitate procedures connected with public services delivery. 216 services were delivered in 2015 by means of the e-Gov portal. Ordering public services online, Kazakhstani citizens can register business on the portal within 1 day and only national ID card is required to do so (in government agency it takes 5-30 days). It is possible to register a foreign visitor on the portal within 15 minutes instead of spending a day in government agency. Submitting documents for Bolashak scholarship, getting attached to polyclinic, signing up for the waiting list in kindergartens, paying for public facilities, fines, taxes, renewing national ID card (an expired to a new one) - all these issues can be resolved without leaving home, provided that a citizen has digital signature.

b) e/m-Business (e-Commerce)

In Afghanistan the legal act on e-commerce is approved. The e- transaction Law, e- signature Law and the legal act regulating electronic documents are being drafted. Therefore the e- signature is not implemented yet.

In Azerbaijan the infrastructure of electronic signature was established in 2011. Now, there are two types of e-signatures. First the electronic card signature was implemented and is currently being applied as the main identification for e-gov.az portal. However, the development of e-signature was not limited with the card base e-signature; later, the mobile version of e-signature was launched to simplify the access to the e-services in Azerbaijan. Currently, all types of business related e-services are available through e-gov.az portal and from websites of other government bodies which enable business entities to do all services online. Especially, the registration of a new business entity was fully digitalized by the e-tax system.

In 2015 there are 92.4 % of the companies with 10+ employees and 98.9% of large companies with 250 or more employees that have broadband connection in Turkey. 12.4 % of medium and lager companies sold their products and services online.

The Electronic Signature Law No. 5070 attributes to secure electronic signature the legal force of a handwritten signature. Then electronic applications started to be developed in order to support the electronic signature infrastructure. Currently, while five electronic certification service providers are active, the number of the electronic signature users has been increasing steadily due to the increase in the number of applications.

Presently many public and private organizations are using e-signature in their institutional procedures. In September 2013, the number of active electronic certificates used in these applications was 510,044 out of these 482,219 are traditional electronic certificates and 27,825 are mobile electronic certificates. The number of active mobile electronic certificates decreased to 27,825 in September 2013 compared to 71,097 in October 2012. The inability to release appropriate SIM cards with new algorithms defined in the update of the ICTA's notification and non-renewal of the expired mobile electronic signatures contributed to this decline.

The Law on the Regulation of Electronic Commerce No. 6563 of 5 November 2014 is the main legal acts on e-commerce and has the purpose to set out the principles and procedures regarding electronic commerce.

The Electronic Signature Law and related legislation includes provisions on mobile electronic signature. Mobile signature services in Turkey are provided by GSM operators (Turkcell, Avea, and Vodafone).

c) e/m-Banking, Mobile Banking

Mobile banking is a success in Pakistan. Most of the Cellular Mobile Operators are providing mobile banking to their customers.

Systematic and durable reforms in Azerbaijan lead to the development of electronic payment systems that resulted in launching the National Payment System (NPS). The Centralized Information System on Mass Payments (CISMP) was put in service in 2008. Following this initiation, the Central Bank of the country implemented in 2012 a dedicated project and created the Government Payment Portal (GPP). This was the next phase to develop the national payment system in order to avoid off-bank cash collection of payments to the state budget and ensure online payment of duties and other payments for services by public authorities. Overall 220 type of payments on GPP integrated public institutions are made in cash at about 1500 payment points of the AzerPost LLC and 42 banks integrated to the infrastructure and in cashless form via payment cards using – "www.gpp.az". Additionally, many banks launched their online banking systems and mobile banking applications in order to improve customer satisfaction.

d) e/m-Health

E-government can deliver public services such as health and education more effectively through broadband, with e-health allowing people in rural and remote areas to access doctors online and e-education enabling youth to receive Internet-based education that would not be physically available.

The wireless broadband which is now the fastest growing segment of the global ICT market serves as a platform for m- learning, m-health and could be used in the developing countries.

E/m-health and e/m- education in remote areas and distant markets with low population densities are more than technology upgrades. They can be effective tools in promoting sustainable development through increased access and community-oriented services that actively involve all segments of society in the formulation, design and provision of needed e-services. But the problem is that mobile broadband is not yet fast, reliable, or cheap in many countries.

E-health, a process of administering health care through ICT tools, is rapidly growing in importance in all parts of the world. The new opportunities for healthcare delivery brought forward by ICTs and the

continued trend of ageing populations are opening new markets with large growth potential. E-health enables remote consultations and healthcare service delivery and better dissemination of vital health information to patients, including particularly, in rural and remote areas. Developments in ICTs are not only changing the way healthcare is delivered, but also offer patients a more active role in the prevention and monitoring of diseases.

M-health is delivering of health-related services using mobile communication technology. M-health is used to data gathering, tracking and analysis of health-related surveys, as well as to registering and monitoring patients. Smartphones, in particular, offer the potential to broadly and cheaply diffuse more intensive self-monitoring, feedback, self-management and clinical support than has been possible previously.

Also m-health information is actively taken up by mobile phone users. But health care requires a more level of privacy and confidentiality and unsecure usage of mobile devices and social media could compromise the confidentiality of the medical information and even healthcare delivery.

 According to some estimates, the global m-health market may reach USD 23 billion in 2017, with Europe accounting for USD 6.9 billion and Asia-Pacific for USD 6.8 billion, ahead of the North American market of USD 6.5 billion. Remote monitoring treatment solutions would constitute almost 60% of total m-health deployments in Europe. Solutions that increase the efficiency of the healthcare workforce and systems make up nearly 15% of overall deployments, alongside health and wellbeing apps.

Telemedicine is a process of accessing health care from a distance through ICT tools. Telemedicine has been successfully implemented in Pakistan.

Electronic health records are another example of ICT use in this sector.

In Afghanistan the initial planning for the telemedicine system was completed and the implementation will start within 2-3 months. The hospital and health information systems, the electronic format of health medical records for patients and online booking are not implemented yet. The Health Mobile Application was developed to survey patients' health for vaccination.

The Pilot project for telemedicine in Turkey started to be implemented early 2015 and it is expected to be nationwide at the end of 2015. Currently, 48% of public hospitals (425/874) can use telemedicine. The adoption of telemedicine by private hospitals (550) is planned to be completed at the end of 2016. The Information Society Strategy 2015-2018 includes programs for the standardization of collecting and delivery of health records. All hospitals (1493) have access to broadband, the connections are made using ADSL, fiber and satellite technologies, and ADSL and fiber are the most widely used technologies. The hospital and health information systems are developed and implemented into the national health systems, but health paper records have not been converted yet to electronic format. The online booking had been implemented. By using the mobile phones patients and doctors can access the medical records. Real time monitoring or mobile telemedicine is not applicable at the moment.

The telemedicine system in Pakistan covers Holy Family Hospital, Rawalpindi, Mayo Hospital Lahore and Jinnah Post Graduate Medical College (JPMC) Karachi. All major hospitals have broadband connectivity. The health information system has been developed and implemented as Pilot Project in Shaikh Zaid Hospital Lahore. The roll out of this system in Federally Administered Hospitals is in process. The online booking is partially implemented.

In last years, a few e-health projects have been implemented in Azerbaijan. "Citizens' electronic health card system" for monitoring of the personal, medical and insurance information tank of the citizens is one of the successfully implemented projects. Another important project is the telemedicine system in the Clinical Medical Centre, established in 2008, to observe clinical operations directly through Internet with 160 connected computer network systems and medical surveillance, registers of thalassemia and hemophilia patients, etc.

e) e/m-Education

Also the bandwidth bottleneck still continues to present a major barrier to effective usage of e-education. In 41 countries across Africa, lack of sufficient bandwidth is found to be the biggest constraint to e-learning.

For example, 64 per cent of the Turkish teachers using Turkey's project, "FATÍH" have reportedly experienced problems with very slow Internet connections. The project seeks to integrate state-of-the-art computer technology into Turkey's public education system and provide tablets and Internet access.

There are 2-3 children per computer in the schools of Afghanistan. The Universities and Higher Educational Institutions' current connections to the Internet are mix of fiber optic connections and satellite links. Till now 109 schools were equipped with smart class equipment and another 150 schools are planned to be equiped in coming years. The Government of Afghanistan is funding ICT in Education.

Formed in 2006 the National Research and Educational Networks (NRENs) also named Afghanistan's Research and Educational Network (AfgREN) focuses on supporting and providing high speed network backbone to universities, higher education institutions, teaching hospitals, libraries and research centers at national level. The AfgREN infrastructure considers a central NOC based at Kabul University, 1 Gigabit Metro Ethernet or 155 Mbps links for Kabul-based Universities, 155 Mbps dedicated links for large provincial universities, 34 Mbps for small universities and sub-campuses.

A MoU of cooperation between Ministry of Communication and Information Technology and Ministry of Education is signed for the development of the strategy "ICT in Education". The online education or e-learning is not implemented yet. Still 3 D learning videos in physics, biology, chemistry and mathematics are now offered.

In Pakistan Ministry of Information Technology 's Virtual University (http://www.vu.edu.pk/) is offering e-education using a combination of video lectures, reading material, audio/video tutorials and on-line interaction (e-class rooms) for imparting knowledge in more than 170 campuses of the University across Pakistan.   Ministry of Information Technology has planned other projects in the rural areas through the Universal Service Fund (USF). Telecenters are being planned for e-services including education. Most schools in cities have internet /broadband connections. The Ministry of Information Technology has initiated various programs for establishing Educational Broadband Centers (EBCs) and Community Broadband Centers across Pakistan through Universal Service Fund. Moreover, special projects for connecting schools have been initiated through USF as well.

With the introduction of mobile broadband (3G/4G) services in Pakistan and after some telecom operators have introduced related mobile applications, all e-education activities are now easily accessible.

The electronic education portal was created in Azerbaijan by the Ministry of Education in order to digitalize the education system, enable the use of electronic textbooks in education and personalize the students' learning process. The E-education offered the opportunity to create a new platform for parents to access the information on the current grades of their children in schools. At the same time, new e-services related to the recruitment of teachers for education entities and the accreditation of educational institutions have been launched.

f) e/m-Agriculture

The term e-agriculture refers to the application of ICTs and their applications in the domain of agriculture and rural development. The key to the role of ICTs in the agricultural context is in bridging information gaps. Information is vital for rural people to be able to make informed decisions on the critical issues they face.

In the past ten years has led to an increase in mobile applications specifically designed for agricultural development. The number of mobile platforms developed and used in the market to bridge the digital divide with smallholder farmers has also increased tremendously, bringing a more diverse range of information sources for farmers (e.g. Internet, radio, TV, newspaper and extension agents) than some years ago. In Pakistan mobile-based agriculture information services are being offered by the operators which is an important channel for agricultural advisory services, financial services and other essential information in rural communities, especially in enhancing access to markets, information on market prices and demand.

Space technology is also essential to monitor threats from the growing number of natural disasters. GIS and agro-meteorological technologies are helpful for land-use planning, crop forecasting and early warning systems.

Pakistan' Ministry of Information Technology has initiated various programs for establishing Educational Broadband Centers (EBCs) and Community Broadband Centers in rural areas through Universal Service Fund, in order to build the capacities of rural stakeholders in the use and application of ICTs.

3.3. Level of the ECO member states development: ICT and Telecommunication Sector of the ECO Member states compared with other regions and the whole world

The ICT Development Index (IDI) is a composite index combining 11 indicators into one value and represents the benchmarking tools developed by ITU to monitor information-society developments worldwide. The objectives of the IDI are to monitor progress in ICT developments in developed and developing countries and to measure the evolution of the global digital divide. Every year ITU publishes the report that presents the ICT Development Index (IDI), which ranks countries' performance with regard to ICT infrastructure and uptake, and the ICT Price Basket (IPB), a unique metric that tracks and compares the cost and affordability of ICT services.

For the purpose of comparing levels of ICT development and analyzing the digital divide, countries are also grouped on the basis of their IDI value. To this end, four groups/quartiles were formed (Table 11), reflecting four different levels of ICT development: high, upper, medium and low.

Table 11. Level of ICT development

Group, Level	IDI Min. (2012)	IDI Max. (2012)	IDI Min. (2013)	IDI Max. (2013)
High	6.46	8.81	6.70	8.86
Upper	4.50	6.45	4.75	6.67
Medium	2.62	4.48	2.79	4.72
Low	0.93	2.61	0.96	2.77

In 2014 ITU published an yearly edition of the "Measuring the Information Society Report" which identifies key information and communication technology (ICT) developments and tracks the cost and affordability of ICT services for 166 countries, different regions in the world and country groups, such as developed and developing countries. Data for this section are used from the above mentioned Report, except that the data for 10 ECO countries are calculated by the author and represent the simple average.

In Table 12 is shown the IDI for the ECO Member States, their global ranks for 2012 and 2013, the level of development and ECO regional IDI average.

Table 12. ICT Development Index (IDI) for ECO countries*

Economy	Global Rank 2012/ IDI 2012/Level	Global Rank 2013/ IDI 2013/Level From 166 countries	
Afghanistan	155/ 1.57 Low	155/1.67 Low	0
Azerbaijan	65/ 5.22 Upper	64/5.65 Upper	1
Iran (I.R.)	97/ 4.02 Medium	94/4.29 Medium	3
Kazakhstan	53/5.80 Upper	53/6.08 Upper	0
Kyrgyzstan	107/ 3.69 Medium	108/3.78 Medium	-1
Pakistan	141/ 2.01 Low	142/2.05 Low	-1
Tajikistan	no	no	
Turkey	68/ 5.12 Upper	68/ 5.29 Upper	0
Turkmenistan	no	no	
Uzbekistan	116/ 3.27 Medium	115/3.40 Medium	1
ECO 10 countries Average*	**3.84 Medium**	**4.03 Medium**	
Range	**4.23**	**4.41**	

Note: *Simple averages. Source: ITU

The highest ranked country from the ECO Member States is Kazakhstan with an IDI value of 6.08, followed by the Azerbaijan with 5.65 and Turkey with 5.29. They are qualified at the "upper" level and exceed the world average of 4.77. Iran (4.29), Kyrgyzstan (3.78) and Uzbekistan (3.40) are qualified at the "medium" level and are below the world average, while Kyrgyzstan (3.78) and Uzbekistan (3.40) are below the developing-country average (3.84). Pakistan (2.05) and Afghanistan (1.67) are qualified at the "low" level and have respectively the 155th and 142nd position in the global IDI.

From 2012 to 2013 Iran went up three places to 94th position, while Uzbekistan moved to 115th position, Azerbaijan to 64th position and altogether they improved their position in the global IDI by one rank. Kyrgyzstan and Pakistan fell by one position in the global IDI and other regional countries remained at the same level.

Table 13 shows the ECO regional IDI average compared to the IDI global average and to the other regions.

Table 13. ECO region IDI values compared with the global, regional and developing/developed-country averages

Region	ECO 10	Africa	Arab States	Asia and the Pacific	CIS	The Americas	Europe	World	Dev-ed	Dev-ing
IDI 2012 Average*	3.84	2.18	4.30	4.42	5.07	4.67	6.98	4.60	7.03	3.67
IDI 2013 Average*	4.03	2.31	4.55	4.57	5.33	4.86	7.14	4.77	7.20	3.84

Note: *Simple averages. Source: ITU

Figure 8. IDI values global, regional, including ECO region and developing/developed-country averages
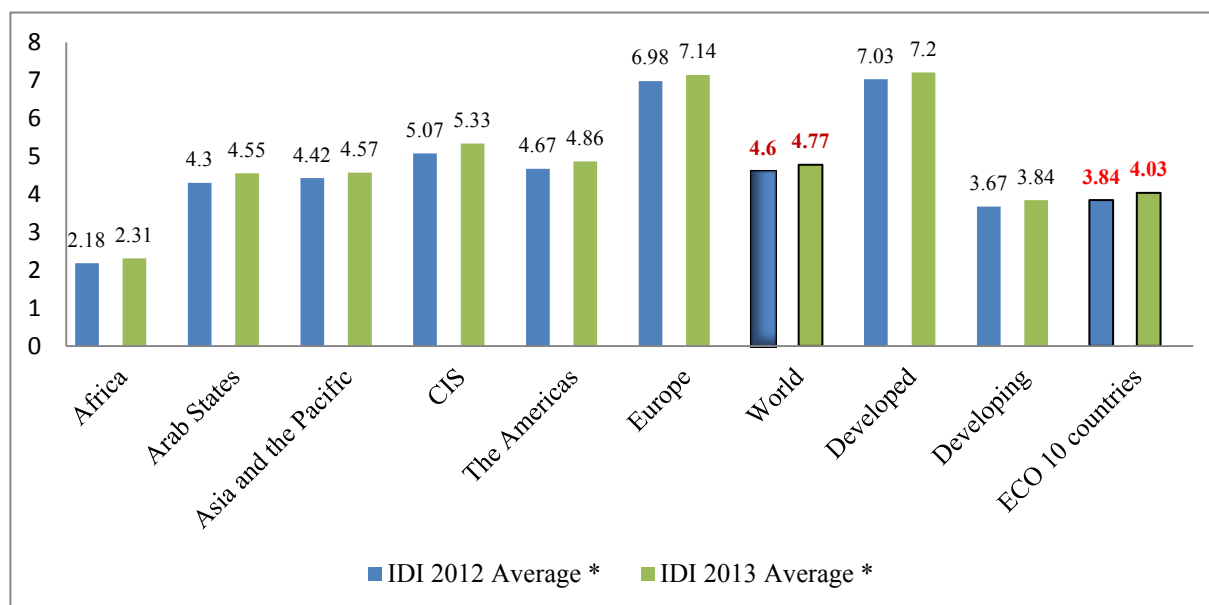
Note: *Simple averages.

In 2013 all regions have made progress in increasing their IDI level compared to 2012. Generally European countries rank very high in their IDI level, having a regional average of 7.14 in 2013. The CIS region has the second highest regional IDI at 5.33 and is followed by the Americas region that features an above-average IDI of 4.86. Asia and the Pacific has a medium regional IDI average of 4.57, which remains below the global average. The Arab States region has the second lowest regional IDI value (4.55), while African countries are found in the low ranks of the IDI with a regional average of 2.31.

From 2012 to 2013 the ECO Member States improved their IDI value and the regional IDI increased by 0.19 units and constitutes 4.03. However, this is still the lowest of all regions after Africa. The regional IDI decreased by 0.74 units as compared to the global average and is lower by 3.17 units compared to developed countries, while higher by 0.19 units compared to developing countries. Figure 8 shows the comparison of global IDI values with IDI averages of different regions, including the ECO region, and developing/developed-countries.

In the ECO region 3 countries achieve an IDI value that is higher than the global average, while the remaining 5 countries are below the IDI global average (4.77). 4 ECO countries are below the developing-country average (3.84).

As mentioned, IDI is a composite index combining 11 indicators and, in order to operate with more aggregated indicators, IDI is divided into the following three sub-indices:

- Access sub-index: This sub-index captures ICT readiness, and includes five infrastructure and access indicators (fixed- telephone subscriptions, mobile-cellular telephone subscriptions, international Internet bandwidth per Internet user, households with a computer, and households with Internet access).
- Use sub-index: This sub-index captures ICT intensity, and includes three ICT intensity and usage indicators (individuals using the Internet, fixed (wired)-broadband subscriptions, and wireless-broadband subscriptions).
- Skills sub-index: This sub-index captures ICT capability or skills as indispensable input indicators. It includes three proxy indicators (adult literacy, gross secondary enrolment, and gross tertiary enrolment), and is therefore given less weight in the computation of the IDI compared with the other two sub-indices.

Table 14 presents the IDI sub-indexes for access, use, skills for ECO Member States, and their global ranks for these sub-indexes for 2012-2013, the level of development and the ECO regional average.

Table 14. ECO Member states - IDI sub-indexes: access, use, skills (from 166 countries)

Economy	Rank 2012/ Access 2012	Rank 2013/ Access 2013	Rank 2012/ Use 2012	Rank 2013/ Use 2013	Rank 2012/ Skills 2012	Rank 2013/ Skills 2013
Afghanistan	151/ 2.23	149/ 2.44	152/ 0.20	154/ 0.24	155/ 2.98	155/ 2.98

	Low	Low	Very Low	Very Low	Medium	Medium
Azerbaijan	73/ 5.83 Upper	73/ 6.07 Upper	58/ 3.55 Medium	52/ 4.40 Medium	73/ 7.33 High	73/ 7.33 High
Iran (I.R.)	85/ 5.11 Upper	82/ 5.53 Upper	116/ 1.18 Low	116/ 1.44 Low	68/ 7.52 High	68/ 7.52 High
Kazakhstan	54/ 6.73 High	56/ 6.84 High	55/ 3.73 Medium	56/ 4.33 Medium	56/ 8.06 High	56/ 8.06 High
Kyrgyzstan	111/ 4.01 Medium	114/ 4.05 Medium	110/ 1.41 Low	114/ 1.59 Low	64/ 7.62 High	64/ 7.62 High
Pakistan	130/ 2.95 Medium	133/ 3.03 Medium	140/ 0.38 Very Low	144/ 0.42 Very Low	150/ 3.36 Medium	150/ 3.36 Medium
Tajikistan	no	no	no	no	no	no
Turkey	77/ 5.66 Upper	77/ 5.83 Upper	69/ 2.98 Medium	69/ 3.24 Medium	48/ 8.34 High	48/ 8.34 High
Turkmenistan	no	no	no	no	no	no
Uzbekistan	136/ 2.78 Medium	136/ 2.95 Medium	98/ 1.94 Low	101/ 2.09 Low	91/ 6.94 High	91/ 6.94 High
ECO 10 countries Average*	**4.41 Medium**	**4.59 Medium**	**1.92 Low**	**2.21 Low**	**6.52 High**	**6.52 Upper**

Note: *Simple averages.

The regional average of Access sub-index in 2013 was 4.59 being at "Medium" level, however closer to the "Upper" level (4.75). Kazakhstan has a "High" level of the Access sub-index, while Azerbaijan, Iran and Turkey have the "Upper" level.

Three countries in the region have a "Medium" level of the Access sub-index, these are Kyrgyzstan (4.05), Pakistan (3.03) and Uzbekistan (2.95). It should be noted that Pakistan and Uzbekistan are closer to the "Low" level (2.77). Also a "Low" level is registered in Afghanistan with 2.44 units.

The regional average of the IDI Use sub-index is at the "Low" level and constitutes 2.21. This indicator is also "Low" in almost all countries in the region, except Azerbaijan (4.40), Kazakhstan (4.33) and Turkey (3.24) which are qualified at the "Medium" level. In Afghanistan this sub-index is "Very Low" with 0.20 units.

The Skills sub-index in the ECO Member States is at the "Upper" level with 6.52 units. All countries have a "High" level of the Skills sub-index, except Afghanistan (2.98) and Pakistan (3.36) which are qualified at the "Medium" level. Figure 9 shows the comparison of the IDI sub-indexes: access, use, skills among the ECO Member States for 2013.

Figure 9 IDI sub-indexes, 10 ECO countries 2013
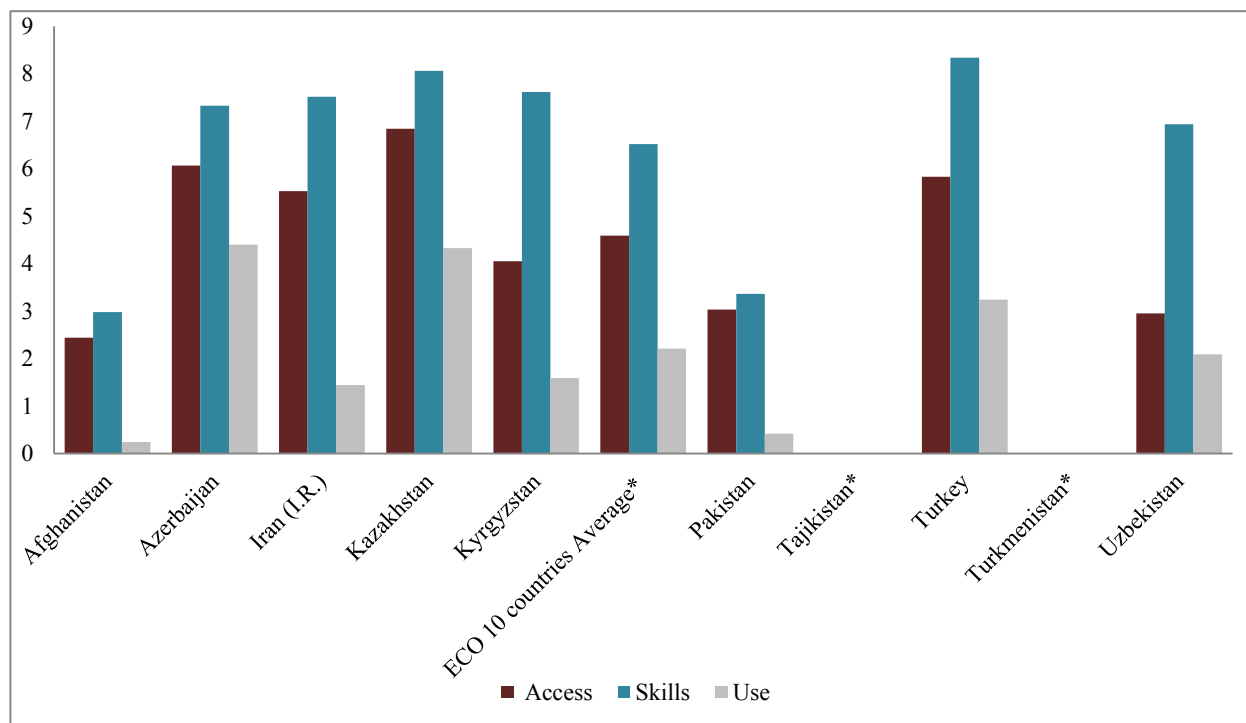
Note: *Simple averages. Tajikistan – no data.

E-Government development in the ECO Member states with other regions and the whole world

E-government has a big potential to improve the model in which the governments deliver public services and enhance the involvement of people in the public service. E-government can be referred to as the use and application of information technologies in public administration to streamline and integrate workflows and processes, to effectively manage data and information, enhance public service delivery, as well as expand communication channels for engagement and empowerment of people.

The e-Government development in the ECO region compared to other regions and the world is provided in the Table 15 and Figure 10 below.

Figure 10. EGDI: Regional and Economic Groupings
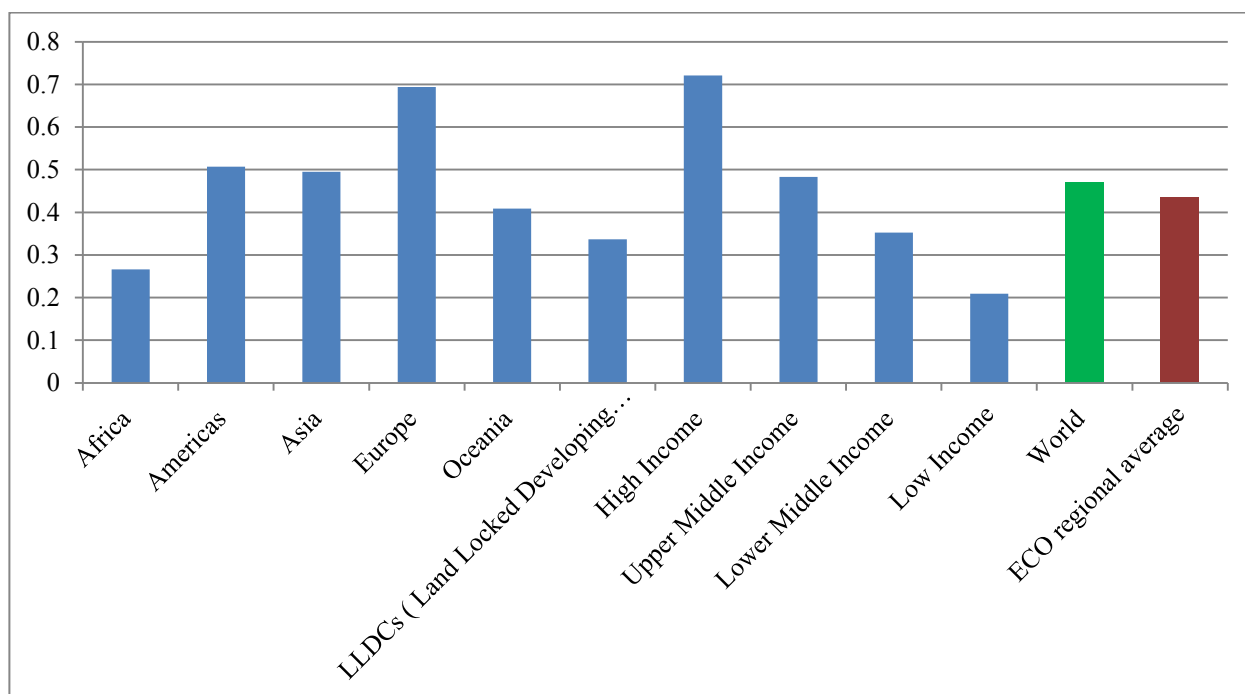
Table 15. EGDI: Regional and Economic Groupings

Region	EGDI/ Level*	Online Service Component/Level*	Telecomm. Infrastructure Component/ Level*	Human Capital Component/ Level*
Africa	0.2661/ Middle	0.2011/ Low	0.1478/ Low	0.4492 / Middle
Americas	0.5074 /High	0.4216/ Middle	0.3805/ Middle	0.7202/High
Asia	0.4951/ Middle	0.4652/ Middle	0.3584/ Middle	0.6615/High
Europe	0.6936/High	0.5695/High	0.6678/High	0.8434
Oceania	0.4086/ Middle	0.2621/ Middle	0.2564/ Middle	0.7073/High
Land Locked Developing Countries	0.3368/ Middle	0.2710/ Middle	0.2025	0.5368/High
High Income	0.7207/High	0.6503/High	0.6845/High	0.8343/ Very High
Upper Middle Income	0.4828/ Middle	0.3709/ Middle	0.3522/ Middle	0.7253/High
Lower Middle Income	0.3523/ Middle	0.3076/ Middle	0.2307/ Low	0.5787/High
Low Income	0.2094/ Low	0.1523/ Low	0.0876/Very Low	0.3884/ Middle

World	0.4712/ Middle	0.3919/ Middle	0.3650/ Middle	0.6566/High
ECO regional average	0.4344/ Middle	0.3488/ Middle	0.3017/ Middle	0.6527/High

*Note: Very High EGDI: more than 0.75; High EGDI: between 0.50 and 0.75; Middle EGDI: between 0.25 and 0.50; Low EGDI: less than 0.25.

In 2014 Europe (0.6936) continues to lead with the highest regional EGDI, followed by the Americas (0.5074), Asia (0.4951), ECO region (0.4344), Oceania (0.4086) and finally Africa (0.2661). The ECO regional average of EGDI values of 0.4344 is slightly below compared to the world average 0.4712. The development of e -Government in the ECO region is qualified at the "Middle" level. Compared to other regions of the world, the e –Government development in the ECO region is higher than in Africa (0.2661) and Oceania (0.4086), but much lower than in Europe (0.6936) and slightly below than in Americas (0.5074) and Asia (0.4951).

The Human Capital Index for the ECO region is positioned as "High" with 0.6527 units and is slightly lower than the world average (0.6566). The ECO regional average for the two other components of the EGDI is a bit lower compared to the same sub - indicators of the world average.

Based on the ECO regional EGDI average and its three components, the ECO region is placed between Upper Middle Income and Lower Middle Income countries.

Landlocked countries of the ECO region

Kazakhstan, Azerbaijan, Uzbekistan, Kyrgyzstan, Tajikistan, Turkmenistan are qualified as Landlocked Developing Countries in the ECO region.

 A landlocked country is one that is entirely enclosed by land, or whose only coastline lies on a closed sea. There are 48 landlocked countries among the UN Member States, 31 of which are Landlocked Developing Countries (LLDCs). They are among the most disadvantaged developing countries, and often rely on their neighbors' telecommunication networks as accessing the international submarine fibre networks would incur high administrative and infrastructure costs. The telecommunication networks are especially underdeveloped in the rural areas, creating an additional barrier to the promotion of inclusive ICT strategies. Thus, for the majority of LLDCs, the Telecommunication Infrastructure Index is the weakest out of the three components of the e-Government Development Index. In such countries, the e-Government plays an important role in contributing through the e-services to the development of trade and entrepreneurship, by simplifying licensing application procedures and improving services in education and health, as well as promoting socially inclusive growth for all.

Kazakhstan is taking the top position and together with Azerbaijan are in top five in the world ranking as LLDCs. Uzbekistan and Kyrgyzstan are included in the top 10 of Landlocked Developing Countries.

3.4. Investments and ICT development projects

In 2015 all the telecommunication investments in Afghanistan represented USD 47.832 Million. In 2014 the investments in the telecommunication sector of Turkey amounted to USD 2.592.947.637 and decreased compared to 2011 (USD 3.353.690.676).

Another situation was in Iran where the investments in the telecommunication sector in 2014 has doubled compared to 2012 and represented USD3.270.015.034.

ECO Member States focus on developing a modern internal infrastructure, as well as ensuring interconnection of internal networks with international links, in order to have access to affordable international Internet bandwidth.

Among the infrastructure projects are those that have the goal to improve broadband connectivity by the deployment of fixed infrastructure, including the expansion of backbone and transmission networks and the installation of fiber-optic lines across the country, especially stressing on the development in rural areas. Other projects aim to expand mobile broadband Internet 4G around the whole territory of the country and increase the speed of data transmission on the Internet up to 100 Mbt/s.

Besides the projects on construction of the international cross border links between neighboring countries, there are projects that envisage the construction of high-capacity regional and sub-regional inter counters networks, which can provide access to the international networks.

The description of some ongoing or planned projects in the ECO Member States is provided below.

Afghanistan

The project "Expansion of the National Digital Telephone Network" has the aim to roll out telecommunications access across the country by constructing a copper cable network in five major provinces: Kabul (104000 lines) Kandahar (13000), Mazar (15000 lines),Kunduz 10,000 lines, and Jalalabad (10,000 lines) and implementation of the Full Mobility throughout the country. Its budget is USD 50.5 million and the funding agency is the Ministry of Finance (MoF).

The project "Optic Fiber Network" has the goal to improve broadband connectivity across the country and connect all the Provinces on the OFC Backbone Networks. For this 1,000 Kms of additional OFC Cable Routes will be installed. This will give access to both the urban and the rural population of the Country to modern ICT Services. The budget is USD 15 million.

Another project is "Building Internet Exchange Point". Its goal is to establish the National Internet Exchange of Afghanistan (NIXA) with the purpose to encourage the exchange of Internet traffic in a free-market environment, between all interested parties. By locating an Internet exchange in Kabul, near the majority of Afghanistan's Internet Service Providers and large Internet users, competition will be spurred, consumer prices will drop, operational costs will be reduced, reliability and redundancy will be improved, and a vast amount of new local Internet bandwidth will be created for sale to consumers.

Azerbaijan

The project "Trans-Eurasian Information Super Highway (TASIM)" foresees the creation of major transit link from Frankfurt to Hong Kong and would ultimately connect as many as 20 countries across Eastern Europe, the Commonwealth of Independent States, Turkey. Islamic Republic of Iran, Central Asia (including Afghanistan and Pakistan), India, and China. TASIM is identified as the "East-West Information Superhighway." Within the project new fiber-optic lines will be constructed, the existing lines will be upgraded and connected to the TASIM network. In the first phase leading regional countries and operators will create a major Internet transit infrastructure, which will allow TASIM to correspond to commercially attractive and rapidly growing international market for IP Internet transit. In the second phase TASIM will provide the Eurasian countries that do not have direct access to the open sea, including Central Asia with Internet connection at affordable rates. The project was presented at the International Telecommunications Union's Telecom World 2009 Conference in Geneva, Switzerland and three United Nations General Assembly resolutions expressing support for the project were formally adopted. The MCIT of Azerbaijan has also funded research for the project's viability. TASIM and Trans-Caspian submarine cable projects are seriously considered by Azerbaijan and its neighbors.

The project "National Computer" has the aim to enable population and support for low-income social groups to buy modern computers at prices 25-30% below the normal market price and licensed software on favorable terms. Concessions are also provided to the buyers to get access to Internet. The implementation of the "National Computer" project is in co-operation with the public institutions and ICT private sector that includes leading international business enterprises. The implementation started in April 2009. The first stage of this project was implemented for teachers at secondary schools by the Ministry of Education with hardware support by HP, software by Microsoft and operational support by the local BestCompGroup. Then schoolchildren, students and university teachers were connected to the project.

The expected results of the project are that the number of computers in Azerbaijan will reach the world average before the end of the project and the ability of the population to use e-government services will increase.

The AzDATACOM network project is the main component of the "National E-Governance Initiative" project implemented by the Ministry of Communications and Information Technologies in partnership with the UNDP. The AzDATACOM project envisages building a network infrastructure for data transmission with coverage of almost all regions of the country. After the launch of the project in 2004, the Azerbaijan DATACOM network was built in four stages. At the first and second stages, the segment of the network covering Baku, Absheron and Sumgayit cities was put into use. Baku-Ganja, Yevlakh-Shirvan, Baku-Astara and surrounding regions of the country were joined to the network in the 3rd and the 4th stages.

Turkey

Three regional projects on international network connectivity were launched where Turkey is participating. Turk Telekom is an investor in the terrestrial pan-regional Jeddah-Amman-Damascus-Istanbul (JADI) Link network with length of 2,530 km, including 920 in Saudi Arabia, 360 in Jordan, 480 in Syria and 770 in Turkey. JADI will have 200 Gbps initial capacity. Turkcell Superonline is an investor in the Regional Cable Network with 7,750 km length and 12.8 Tbps design capacity. However, as of 2014 JADI and the Regional Cable Network are not yet in operation because of their passing though Syria' conflict areas.

A third new regional network, Gulf Bridge International North Route connects Turkey and Iraq and has 4,500 km length, with the capacity of 20 Gbps and the possibility to extend to 40 or 100 Gbps.

Pakistan

The terrestrial cable connecting Pakistan to China via the Khunjerab Pass has a length of 820 km. In 2013 the cable's construction was awarded to Chinese supplier Huawei. The project cost of the network, including connectivity to Karachi, was reported to be US$36 million. A fiber link between Pakistan and Iran, linking the networks TIC and PTCL, is expected to be activated soon.

The Asia-Africa-Europe-1 cable, 25,000 km in length has a landing point in Karachi, Pakistan. PTCL became a signatory to the project's construction and maintenance agreement in January 2014.

A construction and maintenance agreement for SEA-ME-WE-5 project was signed by 15 operators in March 2014, led by France Telecom-Orange and Singtel. Three Chinese operators (China Mobile, China Telecom and China Unicom) were among its signatories, but the project does not as yet feature the participation of any Egyptian, Indian or Pakistani operators, despite proposed landing points in all three countries.

Iran

The cross border fiber connectivity between Iran and Pakistan would provide both countries with improved interregional access—from Iran to South Asia and from Pakistan to northwestern destinations. This project is in the final stages of implementation.

Iran Telecommunications Infrastructure Company project focuses on the development of infrastructure network in Semnan province. The establishment of this fiber-optic network costs over $400b, which will be covered by the government.

Since 2014, 486 kilometers of fiber-optic cable network worth $8.3m were constructed in Semnan province.

Kazakhstan

The project of the JSC "ALTEL" was launched in 2014 to expand mobile broadband Internet 4G. The project cost is KZT 104.9 billion and the Development Bank of Kazakhstan provides about 35% of the necessary funding for up to 10 years. The project' aim is to increase the speed of data transmission on the Internet up to 100 Mbit/s, and introduce e-learning in higher and secondary educational institutions. The development of 4G network is planned in all cities and towns of Kazakhstan. The project will be implemented in two phases. The first, until 2018, it is planned to launch a new generation of wireless communications in all major cities and towns with population of 50 thousand people. The second, until 2022, it is planned to provide networks LTE/GSM/UMTS and introduce LTE networks in all localities of the countries.

Turkmenistan

The Trans Caspian Link will comprise two point-to-point cables linking Azerbaijan with Turkmenistan and Azerbaijan with Kazakhstan. The Azerbaijan-Turkmenistan cable will consist of a point-to-point

cable connecting Baku, Azerbaijan and Türkmenbaşy (Turkmenbashi), Turkmenistan, while the Azerbaijan-Kazakhstan cable will be a point-to-point link between Baku and Aktau (Aqtau), Kazakhstan The estimated length will be 710 kilometers. The Azerbaijan-Turkmenistan cable will be 270 kilometers while the Azerbaijan-Kazakhstan cable will be 440 kilometers.

Uzbekistan

According to the Decree of the President "On measures for the implementation of investment projects for development and modernization of telecommunication network of the Republic of Uzbekistan with participation of the State China Development Bank" as of December 2, 2014 the projects for development of telecommunication infrastructure are being implemented for the total amount of USD 117.6 mln., including those at the expense of credit funds allocated by the State China Development Bank (PRC) for the amount of USD 100.0 million. These projects are aimed at enhancing the capacity of the main data networks: international destinations – 10 times (up to 100 Gbps), to regional centers – 4 times (up to 40 Gbps) and to district centers – 10 times (up to 10 Gbps).

Within these projects it is also planned to develop broadband access to Internet on FTTx technology and modernize subscribers' lines in Tashkent with installation of data transfer equipment for 69,120 ports. The contract amounts to USD 6.9 million.

In December 2015 The Ministry for Development of Information Technologies and Communication of Uzbekistan has unveiled plans to spend USD883.7 million over the next four years on nine investment projects intended to improve broadband access by 2020. The programs will focus on the development of HSPA+ and LTE networks, the expansion of fixed and mobile infrastructure – including the expansion of backbone and transmission networks and the installation of fibre-optic lines, as well as the introduction of new multimedia services. Through these projects, the Ministry hopes to increase the number of fixed broadband ports by 2.2 times, and improve data transfer rates by 20 times. The government is also hoping to introduce 20 new services, as well as further develop IPTV and VoIP services.

3.4.1   Potential sources for ICT projects investments

ICT projects could be financed from a wide variety of sources including governments, multilateral development banks, ICT operators, and other investors. The participation in ICT investment projects is also possible through the non-traditional investors such as Google, Facebook and others. There are several potential multilateral development banks that could finance ICT projects in the ECO region.

The World Bank is an international financial institution that provides loans to developing countries for capital programs. It provides low-interest loans, zero to low-interest credits, and grants to developing countries. These investments are in education, health, public administration, infrastructure, financial and private sector development, agriculture, and environmental and natural resource management. Some of the World Bank projects are co-financed with governments, other multilateral institutions, commercial banks, export credit agencies, and private sector investors.

The Asian Development Bank (ADB) is defined as a social development organization that is dedicated to reducing poverty in Asia and the Pacific through inclusive economic growth, environmentally sustainable growth, and regional integration. This is carried out through investments – in the form of loans, grants – in infrastructure, health care services, financial and public administration systems, helping nations prepare for the impact of climate change or better manage their natural resources, as well as other areas. Among

the five operational areas of the Asian Development Bank is infrastructure, which includes communications area.

The European Bank for Reconstruction and Development (EBRD) is a multilateral developmental investment bank and it uses investment as a tool to build market economies. It supports development in 30 countries from Central Europe to Central Asia. EBRD is furthering progress towards 'market-oriented economies and the promotion of private and entrepreneurial initiative. The EBRD finances projects in several sectors including the telecommunications and information technology.

The Black Sea Trade and Development Bank is a multilateral development bank serving the eleven countries, among them are Azerbaijan and Turkey. It supports economic development and regional cooperation by providing trade and project financing, guarantees, and equity for development projects. BSTDB supports both public and private enterprises in its member countries. Objectives of the bank include promoting regional trade links, cross country projects, foreign direct investment, supporting activities that contribute to sustainable development.

The Asian Infrastructure Investment Bank (AIIB) was founded recently in 2014 and is a multilateral development bank, with the aim to promote interconnectivity and economic integration in the region. It focuses on the development of infrastructure and other sectors in Asia, including energy and power, transportation and telecommunications, rural infrastructure and agriculture development, water supply and sanitation, environmental protection, urban development and logistics, etc.

3.5. Identification of the needs of the ECO Member states for further ICT development

The great differences among the countries in bandwidth per Internet user in ECO region have impact on the overall regional development. The low International Internet bandwidth per Internet user in Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan has impact on the development of domestic infrastructure, penetration rate and affordability of broadband services. Mostly are suffering landlocked ECO countries that do not have access to submarine fiber optic cables and are dependent upon their neighbors.

The ECO inter-countries terrestrial connectivity has low-capacity, high-cost and consists mostly of bilateral, point-to-point trans-border links. There are very limited multinational terrestrial fiber networks serving more than two countries. The low bandwidth per Internet user involves high IP transit prices and vice-versa. The major reason for the shortage of international bandwidth is cost. The small size of Internet markets means that economies of scale in discounted bulk purchases of international bandwidth are not available. The ECO landlocked countries must rely on satellite connectivity that is more expensive and provides less capacity. Another reason for high costs is the difference in payment arrangements for Internet connectivity compared to voice telephone traffic. Related to voice telephony developing countries receive income for terminating calls. While regards Internet, developing countries must pay the full costs of the connection to developed countries, where most content originates.

Policy and strategy

Like other regions, the ECO Member States need closer cooperation in information society development and facilitation of access to broadband. For this purpose and in order to improve access to affordable ICT, efficient and effective utilization of ICT for sustainable development in all sectors of economy, an ECO Regional Strategy for Information Society Development should be adopted.

In order to provide international connectivity through fostering regional cooperation on submarine cable and regional fiber optic networks deployment, an ECO Regional Strategy for Broadband Development should be envisaged that will establish key priorities, targets and milestones, long-term objectives, plans and projects to implement the strategy.

Although almost all ECO Member States have approved the national strategic document for ICT and information society development, no ECO country has a special strategy devoted to the broadband development. For instance, OECD countries that are leading in terms of broadband penetration, as a rule, implemented a national policy and strategy on broadband. These countries include the Republic of Korea, Denmark, Netherlands, Sweden, Finland and United Kingdom.

For a better adaptation to the new converged environment, it is recommended to develop national broadband strategies that will become essential components of deployment of broadband services and access to them. The main goal of the national digital strategies could be the promotion of the development of broadband infrastructure, the facilitation of access for all citizens to high or ultra-high broadband at affordable prices, the increasing of the coverage of the country, especially in rural and remote areas.

Markets development

In all countries of the ECO region fixed-telephony markets are still dominated by an incumbent operator and competition is low or does not exist. Only in Turkey some new alternative operators occupied a part of the market segment and the market share of incumbent Turk Telekom decreased to 86.1% in 2014, while in the 3rd quarter of 2015 it was 84.5%. In some ECO Member States the fixed telephony penetration is low or very low. For instance, in Turkmenistan, where the incumbent operator Turkmentelecom has a monopoly in the fixed telephony market, the fixed telephony penetration is 11.77%. In Uzbekistan, where Uzbektelecom maintains exclusive right over the country's international gateway infrastructure, the penetration is 8.55%, in Kyrgyzstan - 7.88% and in Tajikistan - 5.24%. The lowest penetration is in Afghanistan (0.33%) and Pakistan (2.65%).

The less affordable fixed-telephone prices in the ECO region are in Pakistan (4.27% of GNI p.c) and Afghanistan (2.78% of GNI p.c.), other ECO countries have affordable enough prices for fixed- telephone services.

The fixed (wired)-broadband market in Afghanistan, Tajikistan, and Turkmenistan showed stagnation during the last 3 years with a respective penetration of 0.01%, 0.07% and 0.04%. In Kyrgyzstan and Pakistan the fixed- broadband services are expensive and exceed more than 2 times the 5% level of affordability, while the least affordable fixed- broadband services in the ECO region are in Afghanistan with 38.61% of GNI p.c. Slightly above the 5% level is Uzbekistan with 5.14%.

In the ECO region the mobile-cellular markets are fiercely competitive with at least three mobile operators in each country. All countries have now 3G mobile services, in Afghanistan, Pakistan and Uzbekistan approximately 2/3 of the population are subscribed to mobile-cellular telephony.

Commercial 4G/LTE services have been launched in major cities in Azerbaijan, Pakistan, Iran, Kyrgyzstan, Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan. In 2016 Turkey's mobile operators Vodafone, Turkcell and Avea are going to launch 4G services based on the spectrum auction for deployment of LTE networks that took place in 2015.

Mobile broadband penetration in the ECO Member States reached 23%. A level below 5% is in Iran (2.5%), Afghanistan (1.2%) and Pakistan (0.8%).

The mobile-broadband prices in handset-based are not affordable in three ECO Member States. The mobile-broadband prices in handset-based which are above the threshold of 5% are in Kyrgyzstan with 8.88% of GNI p.c., in Afghanistan with 10.78% of GNI p.c and in Tajikistan with 17.01% of GNI p.c

Following the analysis of the existing situation on ICT markets in the ECO Member States, the next recommendations and suggestions are proposed. All ECO Member States, especially Afghanistan, Tajikistan, Turkmenistan, Pakistan and Uzbekistan should develop their fixed broadband markets. In order to improve the situation on markets development is recommended to exclude exclusive rights and monopoly of the incumbent operators or other market players, to introduce real competition on fixed-telephony market and apply the regulatory measures in order to protect the competition by removing obstacles for market entry for new operators. It is also recommended to apply ex – ante regulations by imposing relevant obligation to incumbent operators, which are Dominant Operators, or to all other operators that have Significant Market Power on the relevant market.

For fixed- broadband deployment is recommended to introduce the regulatory instrument ULL, which means that the operator with SMP is obliged to offer access to the local loop and publish the Reference Offer for the Access to the Local Loop (RUO), offering to other operators shared access to the local loops or full access to the local loops.

Afghanistan, Iran and Pakistan should develop the wireless broadband markets by implementing and deploying 3G and 4G networks and services on the overall territory of these countries.

Afghanistan, Kyrgyzstan Pakistan and Uzbekistan should take measures to reduce the prices for fixed-broadband services and make them affordable for the end users. Afghanistan, Kyrgyzstan and Tajikistan should reduce the prices for wireless broadband services and make them affordable for the end users. In order to reduce the costs of fixed and mobile broadband roll-out, all ECO Member States should create and implement physical infrastructure sharing.

International connectivity

The major differences among the countries in the ECO region in terms of bandwidth per Internet user have an impact on the whole regional development. The low International Internet bandwidth per Internet user in Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan has an impact on the development of domestic infrastructure, penetration rate and affordability of broadband services. Mostly suffer the landlocked ECO countries that have no access to submarine fiber optic cables and are dependent on their neighbors.

The ECO inter -countries terrestrial connectivity is of a low-capacity, high-cost and consists mostly of bilateral, point-to-point trans-border links. There are very limited numbers of multinational terrestrial fiber networks serving more than two countries. The low bandwidth per Internet user involves high IP transit prices and vice-versa. The major reason for the shortage of international bandwidth is cost. The small size of Internet markets means that economies of scale in discounted bulk purchases of international bandwidth are not available. The ECO landlocked countries must rely on satellite connectivity, which can be more expensive and provide less capacity. Another reason for high costs is the difference in payment arrangements for Internet connectivity compared to voice telephone traffic. For voice telephony,

developing countries receive income for terminating calls, while for Internet the developing countries must pay the full costs of connection to developed countries. This is due to the fact that the content originates from developed countries.

There are active only 4 IXPs in Iran, Pakistan, Turkey and Uzbekistan and they serve 54 participants (ISPs). Because IXPs are used to route domestic traffic within the country or region without needing to exchange data through international carriers, this significantly improves the network performance in terms of latency and stability, and it also decreases costs for domestic ISPs.

Affordable international bandwidth is an essential component for the ECO countries to become and remain competitive in a changing world. Access to competitively priced wholesale international bandwidth allows operators to provide cheaper Internet access to their users.

The existing situation can be improved by an enhanced regional cooperation, as well as by establishing a competition climate within the ECO Member States. An open access approach for international fiber cables is the way of getting the affordable international bandwidth that will help drive further growth in the ECO markets. In order to achieve that is necessary to:

a) create competitive conditions on the international access market and exclude any form of monopoly regarding access to international circuits. Countries with the monopoly on international access market should liberalize the access to the international gateway , introducing the competition on this market and removing all legal and regulatory barriers in the development of international connectivity;
b) create the regulatory environment oriented to foster open access on submarine cable in the ECO countries;
    o In the situation where an operator has significant market power (SMP) on the market of the access to international capacities available on the submarine cable landing in the country, particularly where there is a single cable landing station in this country or several cables landing operated or controlled by the same operator. Then the obligations mandated on operator operating or controlling one or several CLS are based on the significant market power of this operator. The National Regulatory Authority should declare this operator as holding a SMP and imposing on it the obligations of non-discrimination and cost-oriented tariffs or other relevant obligations.
c) create access to "gatekeepers" through which landlocked countries of the ECO region have to pass on the way to international canals of high-capacity, including access to submarine fiber optic cables. These conditions imply removing high costs of accessing rights-of-way for deploying optical fiber canals for ECO Member States, infrastructure sharing, co-location conditions, etc;
d) reduce barriers to cross-border connectivity so that more cross-border infrastructure can be deployed and interconnected;
e) reduce the cost of infrastructure deploying, especially fiber optic connectivity by the facilitation of infrastructure sharing using supporting constructions next to roads, railroads, or using electricity transmission networks, and encouraging or requiring sharing of state and private infrastructure, including ducts, conduits, poles, masts, antenna installations, towers and other supporting constructions;

f) break the vicious circle "bandwidth' volume –IP transit price" by offering to the ECO countries for a certain period, determined by regional agreements, a price discount in order to enable these countries to increase the volume of international Internet bandwidth;

g) aggregate the International Internet traffic by using regional, sub-regional and inside the country IXPs in order to have the power to negotiate and obtain low prices for IP transit for bigger volume of the international Internet bandwidth. IXPs can be established with the direct support of the government(s) or by a group of ISPs and governments that provide an essential element by creating an enabling, competitive environment and properly regulating the existence and provision of this type of services;

h) develop local content and stimulate and ensure favorable conditions for companies to deploy caches or servers to hold local or international content;

i) ensure direct access to cost-effective IP transit capacity by constructing a high –capacity and low-cost regional fiber network(s) that will connect regional less-developed broadband markets, especially in landlocked countries, with the international canals of high-capacity.

Information society services

The Government websites of the ECO Member States are at different stages of development. In Tajikistan, Turkmenistan and Afghanistan the Governments' websites are at Stage 1 (low) with a level of development of around 30-40%. They should improve the value of the Online Service Indicator (OSI) by finalizing the Stage 1 of the Government websites and should focus on developing the next Stages 2, 3 and 4. While Turkey, Uzbekistan and Azerbaijan should finalize the Stages 3 and 4 of the development of the Government websites.

The ECO regional average of the Telecommunication Infrastructure Index is 0.3017 which represents a mid level of development. Individuals using Internet in Afghanistan, Turkmenistan and Pakistan are below 10%. The low level of development in the ECO Member States of the fixed telephony market, fixed-broadband and wireless broadband markets becomes an obstacle in the development of the information society in these countries. The recommendations for infrastructure development were provided above.

A lower level of Human Capital Index is registered in Afghanistan (0.20) and Pakistan (0.30). The low adult literacy rates in some ECO Member States and little education or low average years of schooling could prevent these countries from making significant advancements in e-government development.

In order to build the human capital one should improve the adult literacy, gross enrolment ratio, increase the expected years of schooling and mean years of schooling. Besides improving the ICT literacy of the population is also very important.

4. **Legal framework in the ICT sector of the ECO Member states**

The establishment of a legal and regulatory framework is largely determined by a country's legal tradition, multilateral and regional commitments, the maturity of the market, and other specific legislation, such as tax, foreign ownership, consumer protection, and real property laws.

In most cases, the legal framework follows a hierarchy, beginning with primary legislation, such as laws and decrees, from which secondary legislation, such as regulations, resolutions and guidelines, emerges. This legislation, in turn, provides the legal basis for the regulator or the relevant ministry to issue authorization instruments such as licenses, concessions, and permits to operators.

In the past decade the ECO Member States have made considerable efforts to create and improve the legal framework in the ICT field. With some degree of approximation, several stages can be highlighted of establishing and adapting the legal framework of the 10 ECO Member States both at the market development level, as well as new technologies. The first stage happened during the years 1990 -2000, which is characterized by predominantly monopolistic market regulation with elements of competition in some liberalized markets. The second stage was between 2003 -2009 and required a legal framework through which countries have ensured the transition from monopoly to competition for majority of the markets. The third stage (2010 -2015) can be characterized by establishing competitive market legislation oriented to ensuring convergence of the technologies, creation of an information society, based on well-developed infrastructure, with high and super high speeds of the transmission.

In all ECO Member States, except Iran, a legal framework for the telecommunications sector was adopted which consists of a basic law such as Law on Communications/Telecommunications/ Electronic Communications. The basic law usually establishes the rules and conditions for the operation and provision of telecommunications networks and services, defines the competences of the authorized bodies in the sector, the licensing regime, management of scarce resources, as well as the rights and obligations of operators and service providers, dispute resolution and consumers protection.

The third stage requires a legal framework oriented towards the development of the information society, such as Electronic Commerce Law, Electronic Signature Law, Data Protection Law, Electronic Document Law, Cybercrime Law. All of the ECO Member States have approved an Electronic Commerce Law. The Electronic Signature Law is in Azerbaijan, Turkey, Kyrgyzstan and Uzbekistan, while the Electronic Document Law - only in Azerbaijan, Kyrgyzstan and Uzbekistan. The Data Protection Law is approved in Azerbaijan, Iran, Kazakhstan, Kyrgyzstan, Turkey and Tajikistan. Cybercrime legislation is present in 7 countries of the region - Azerbaijan, Iran, Kazakhstan, Pakistan, Turkey, Turkmenistan and Uzbekistan.

Currently the majority of the ECO countries are amending or revising the ICT legal framework. For example Turkey has prepared a series of draft laws on the information society, Azerbaijan harmonizes the Law on Telecommunications (2005) with the *acquis* of the European Union "package 2002".

The following table 16 provides an overview of the relevant legislation on the telecommunications and information societies in the ECO Member States. It shows only the year of the original version of the law which is currently in force.

Table 16. Legislation on the telecommunications and information societies in the ECO countries

	AF	AZ	IR	KA	KY	PA	TA	TU	TUR	UZ
Law on telecommunications /communication/electronic communications	2005	2005	no	2004	1998	1996	2002	2008	2010	1999

Electronic Commerce Law	yes	2005	2003	yes	yes	yes	yes	2014	2014	yes
Electronic Signature Law	draft	2004			2004			2004	2004	yes
Data Protection Law	no	2010	yes	2013	yes	no	yes	2016	no data	no
Electronic Document Law or E-government Law	draft	2004			2004					yes
Cybercrime legislation	no	2001	yes	yes	no data	yes	no data	2007	yes 2007	yes

Afghanistan

The legal act that governs the telecommunications sector is the Telecommunications Services Regulation Law (2005). It sets out the general legal framework for telecommunications in Afghanistan and contains a detailed institutional framework i.e. separation of policy- maker from the operator functions and regulatory ones. The Law foresees the setting up of the telecommunications regulatory authority and describes its objectives, functions and duties. The legal provisions on licensing, competition policy, interconnection, co-location, scarce resources management, universal access, tariffs regulations, penalties and sanctions, dispute resolution in the telecommunications field are also stipulated.

Afghanistan's ICT policy documents and legal framework of 2003 -2005 were fully compliant with the institutional framework for ICT sectors required by the World Trade Organization (WTO). By making the Ministry of Communications and Information Technology (MCIT) responsible only for policy, by establishing an independent regulator - Afghanistan Telecommunication Regulatory Authority (ATRA) and by corporatizing Afghan Telecom represented the first step to removing the government from the provision of services to the public.

Azerbaijan

In order to accelerate the development of ICT in Azerbaijan and improve the normative and legal framework, there were undertaken important steps on the liberalization of services and development of the private sector. Thus, the Laws on Electronic Signature and Electronic Document (2004), Telecommunications (2005), Electronic Commerce' (2005) were adopted. The Law on Telecommunications is the legislation governing the telecommunications sector. The Law establishes general principles for the telecommunications activity in the country; determines the regulatory tools, including licensing, interconnection, radio frequencies and numbering resources; tariffs for services and

radio frequencies resources; competition and antimonopoly activity; universal services; certification . In 2014 the Ministry of Communications and High Technologies proposed amendments to the 2005 Law in order to set up an independent national regulatory authority as part of a broader program to align the country's legislation to the EU one. The program is outlined in the Action Plan on Legal Approximation of the Legislation of the Republic of Azerbaijan with the EU *acquis* for 2010-2012.

Iran

The law that establishes the institutional framework in the ICT sector is the Act of Duties and Powers of the Ministry of Communications and Information Technology, adopted in November 2003 and the Articles of the Association of the Communications Regulatory Authority of June 2008. There is no specialized law that governs the telecommunications sector.

The Electronic Commerce Law of the Islamic Republic of Iran was ratified by the Guardian Council in 2003 (1382/10/24).

Turkey

During the past ten years the alignment of the Turkish national legislation with the EU *acquis* was the most important legislative work. Turkey's legislation is a complex hierarchy of laws, bylaws and regulations, with several key issues addressed only by secondary legislation. In 2008 Turkey has adopted the Electronic Communications Law No. 5809 which is based on the EU 2003 regulatory framework for electronic communications. The Electronic Communications Law no. 5809 has not entirely replaced the Law no. 406 on Telegrams and Telephones of 1924 and the Wireless Law no. 2813 of 1983, still in force, although most of their articles have been either repealed or replaced by new text during the last years. The Law no. 406 on Telegrams and Telephones is about the incumbent's legal status and the legal basis of a telecommunications tax. The Wireless Law no. 2813 was renamed and is now Law on the Establishment of the Information Technologies and Communications Authority. Several other legislative acts such as the Electronic Signature Law, No 5070 of 23 January 2004, the Law on Payment and Securities Settlement Systems, Payment Services and Electronic Money Institutions No 6493 of 27 June 2013, the Law on the Regulation of Electronic Commerce No 6563 of 5 November 2014, the Law on Regulating of Publications on the Internet and Combating Crimes Committed by Means of Such Publications No 5651, 2007 were adopted.

Recently Turkey adopted a data protection law. The Law on the Protection of Personal Data, No. 6698 has been approved by the Parliament's General Assembly on 24 March 2016 and it entered into force on 7 April 2016. According to the Law the Data Protection Board and Data Controller Registry should be established until 7 October 2016. Turkey is planning a reorganization of responsibilities in the domain name administration.

Pakistan

The main law is the Pakistan Telecommunication (Re-organization) Act No. XVII of 1996 which envisages the re-organization of the telecommunication system.

The Prevention of Electronic Crime Bill is being processed for approval by the Parliament.

Kazakhstan

The Law on Communications No. 567-II of 5 July 2004 (amended in January 2012) is the primary legislation for the telecommunications sector. Other legislation impacting the sector includes the Law on Licensing (amended in 2012), the Law on Natural Monopolies and Regulated Markets No. 272-I of 9 July 1998, the Law on Competition, plus relevant secondary legislation. On 26 November 2013 a new Personal Data Protection Law No. 94-V came into force in Kazakhstan and introduces new concepts in the regulation of personal data in the country.

Kyrgyz Republic

The Kyrgyz Republic has adopted a set of legal and normative acts in the telecommunications and information sector. The most important are the Law No. 31 of 2nd April 1998 on Telecommunications and Postal Communication and the Regulation on the State Agency for Communication under the Government of the Kyrgyz Republic approved by the Government Decision of the Kyrgyz Republic No. 124 of 20 February 2012. The Law on Telecommunications and Postal Communication establishes the legal framework for the operation of telecommunications networks and the provision of telecommunications and postal services in the Kyrgyz Republic, defines the competence of state executive bodies authorized to regulate such services, the regime of obtaining the necessary licenses and permits for the services provision, as well as the rights and obligations of legal and natural persons operating telecommunications networks and service providers of telecommunications and postal services (including JSC "Kyrgyztelecom" as national operator), as well as users of these services.

In 2012 and 2015 the Law on Telecommunications and Postal Communication was amended with a number of provisions relating to the use, administration and payments for numbering resources, the introduction of number portability and pre-selection of the service provider, the definition of the minimum set of universal services and the regulation of their supply, as well as the issuance of licenses based on the results of the bidding.

Tajikistan

The legislative and normative acts related to telecommunications and information technologies are the Law on Electrical Communication No. 56 of 10th of May 2002, the Decision of the Government of the Republic of Tajikistan on approving the "Regulation on the Communications Service under the Government of the Republic of Tajikistan", the Decree of the President of the Republic of Tajikistan on State Strategy on Information and Communication Technologies for the Development of the Republic of Tajikistan, the Decision of the Government of the Republic of Tajikistan on the Economic Development Program of the Republic of Tajikistan until 2015.

Turkmenistan

The main legal basis for the regulation of the communications sector is the Law of Turkmenistan on Communications (2010), which replaces the Law on Communications from 2000.

The Law on Radio Spectrum No.30-II of June 15, 2000 and the Law on Licensing of Certain Types of Activities of July 8, 2008 establish important rules and legal provisions for the ICT sector.

Uzbekistan

Like other countries in the region Uzbekistan has adopted a series of legal documents in ICT, including the Law on Communications dated 13.01.1992, the Law on Telecommunications dated 20.08.1999, the Law on Radio Frequency Spectrum dated 25.12. 1998, the Law on Licensing Certain Types of Activities dated 25.05.2000; the Law on Informatisation, the Law on electronic digital signature, the Law on electronic document management, the Law on electronic commerce.

5. Institutional framework in the ICT sector of the ECO Member states

5.1.ICT policy making authorities in the ECO Member states (ministries, departments)

After the institutional reform in Afghanistan in 2003, the MCIT is ensuring the institutional leadership in the ICT and acts as the policy- maker in the sector. The primary responsibility of the Ministry is developing broad ICT policies and establishing the directions for the development of the telecommunications sector by promoting domestic and international investments, encouraging competition, stimulating the introduction of telecommunications network services in underserved and rural areas. MCIT supervises the implementation of certain large-scale infrastructure projects, including the Optical Fiber Cable (OFC) project, the Copper Cable Network (CCN) project and establishing the National Data Centre (NDC).

The Ministry of Communications and High Technologies of Azerbaijan is a central executive body which formulates and implements the state policy, ensures the legal normative regulation in the areas of communications (telecommunications and post) and high technologies: information technologies, microelectronics, space, nano, bio and other innovative knowledge-based technologies. The Regulatory Department within the Ministry regulates the telecommunications sector. It grants special permit (license) for the provision of telecommunications services and monitors compliance with the conditions of the license, regulates the interconnections of the public telecommunications network, defines the rules for allocation and utilization of number resources, and takes action on the disputes resolution. The Regulatory Department together with other relevant government agencies also participates in regulating the use of radio frequency resources, control of the services quality, monitoring the development of markets, analysis of the markets, determining specific requirements for the dominant operators and service providers.

The Ministry of Posts, Telegraph and Telephone of Iran was established in 1968. In 2003 the duties of the Ministry were changed and renamed into the Ministry of Communications and Information Technology (ICT). The new duties and responsibilities of the Ministry were stipulated in the Act of Duties and Powers of the Ministry of Communications and Information Technology. Under this Act was established the Communications Regulatory Authority that is an affiliated entity to the Ministry. The Ministry has the functions of formulation of overall policies and regulations for the development of communications and information technology within the framework of the overall policies of the State, management and control of the country's radio frequency spectrum, licensing for postal, telecommunications and information technology services, planning and supervision of national ICT networks. The Communications Regulatory Commission of Iran consists of seven members; among them is the Minister of ICT (Chairman), the Deputy Minister, who is also the head of the Communications Regulatory Authority. The Commission has the authority to reform and re-structure the communications sector, formulate (approve) the communications regulations, establish the policy for issuing radio frequency licenses and determine and collect of the relevant licensing royalty, set up the tariff policies in the sector. The regulations on the duties and working procedures of the Commission are approved by the Board of Ministers. The High Council of Information Technology was established as a policy-maker in information technology and has

the duty to formulate the national strategies in this sector. The Council also formulates medium and long-term plans for the development of basic and practical research in the area of information technology, expanding the use of information technology and communications in the county and development plans for various sectors. The Council's decisions, upon the approval of the President, are issued for implementation by the Minister of ICT, who is responsible for monitoring their implementation. The Supreme Council of Cyberspace was established to oversee the country's Internet sector and develop policy for all cyber-related issues.

The Ministry of Transport Maritime Affairs and Communications is a government ministry of the Republic of Turkey, responsible for road, rail, maritime and air transport and electronic communications services in country. The Ministry has the functions of policy maker in electronic communications sector and is responsible for setting strategies and policies on services from this sector, which are based on scarce resources such as numbering, internet domain names, satellite position and radio frequencies, for determining principles and policies that encourage the development of electronic communications sector in free competitive market and supporting the transformation into an information society. The Ministry also establishes the policies on construction and development of electronic communications infrastructure, network and services, the policies regarding the development of electronic communications equipment industry in the country. According to the Electronic Communications Law, the Ministry is accountable for promoting research, development and training activities for the needs of the electronic communications sector. The financing of such activities is foreseen through the transfer of funds from the National Regulatory Authority amounting up to 20% of its revenue. The Ministry is responsible for determining the authorization policy for the services that involve the use of radio spectrum resources and can be provided on the national scale by a limited number of operators. While determining the number of authorizations and their duration, as well as carrying out the tender procedures falls within the scope of the National Regulatory Authority competences, the Ministry has also the right to open tender procedures directly on its own to issue authorizations for services with the use of frequency resources on the national scale. Under the Universal Service Law No. 5369 of June 16, 2005, the Ministry remains responsible for the regulations and implementation of universal service, the management of the universal service fund. The Ministry is also responsible for the e-Government Strategy and the Action Plan, whereas the Ministry of Development is responsible for the Information Society Strategy and Action Plan. The 2016-2019 National e-Government Strategy and Action Plan is prepared by the Ministry of Transport, Maritime Affairs and Communication and it will be published officially in April 2016.

The Ministry for Investment and Development of the Republic of Kazakhstan established by the Decree of the President of the Republic of Kazakhstan No. 875 on 06.08.2014 is a state authority responsible for a large area of activities, including communication, informatization, e-government and information, development of local content. It also deals with the state innovation policy and the policy for supporting investments, creates a favorable investment climate. The Ministry is financed from the state budget. The Communication, Informatization and Information Committee created in 2015 is a body that structurally and functionally belongs to the Ministry for Investment and Development of the Republic of Kazakhstan. The Committee is responsible for implementation of state policy and has regulatory functions in the ICT sector. The Committee has regulatory and supervisory functions in the field of communication, informatization and broadcasting. Related to communications these functions include:

- development, coordination and approval of regulatory and normative acts on communication and informatization, including the rules of providing communication services;
- licensing and control in communications and information;

- planning, assignment and use of the radio- frequency bands, radio frequency and channels for civil use, allocation of numbering resources and assignment of numbers and other national resources.

The Committee also has the duty to implement the state policy and regulate activities related to broadcasting and informatization, including "electronic government" and provision of public services. It has the right to approve regulatory documents, however according to Article 13 (1) and Article 25 (2) of the Law on Communications some of them, such as interconnections rules or numbering resources regulations, assignment of numbers and withdrawal, are approved by the Government.

The central executive authority of the Kyrgyz Republic responsible for the implementation of the state policy in telecommunications, information, radio and television broadcastings, as well as postal communications is the Ministry of Transport and Communications.

Established in 2011, the Communication Service under the Government of the Republic of Tajikistan is the central body of executive power in the sector of telecommunications, postal services and information that has the functions to determine the policy and strategy in this area. Beside these functions the Service has the regulatory functions. The Communication Service is headed by a Head, appointed and dismissed by the Government, who is personally responsible for carrying out the tasks assigned to the Communication Service and the implementation of the state policy. The Head has two deputies appointed and dismissed by the Government. He provides the overall management of the Communication Service, issues orders and instructions that are binding to the members of the Communication Service, state agencies, regional bodies and enterprises of the Service. The Communication Service is legally and functionally independent from the network and/or services operators and providers, manufacturers of electronic communications equipment.

The public administration in the communications sector in Turkmenistan is accomplished by the Cabinet of Ministers and the Ministry of Communications. The Cabinet of Ministers is responsible for policy making, establishing priorities for sector development, international cooperation, state policy on allocation and use of radio frequency spectrum, approval of the Radio Spectrum Allocation Table and establishment of the procedure for allocation of radio frequencies. The Ministry of Communications, under the Cabinet of Ministers, is the central authority in the communications sector and is responsible for the implementation of state policy. It is also the regulatory body responsible for state policy implementation, performing state regulation and control in the communication sector. The Ministry regulates the communication sector by developing normative acts and standards, issuing the licenses, developing, allocating and managing the numbering resources, creating conditions for functioning of telecommunication service market, managing national resources in communications, technical supervision and control and regulating cooperation and relationships between undertakings and individuals and protecting consumers, sets tariffs and carries out investigations to check that operators conform to all laws and regulations.

The Ministry for Development of Information Technologies and Communications of the Republic of Uzbekistan was established by the Presidential Decree on February 4, 2015 on the basis of the State Committee for Communications, Information and Telecommunication Technologies. The objective of the Ministry is the implementation of a unified state policy in the area of information technology and communications, the implementation of "e-government". The main responsibilities of the Ministry are the improvement of state governance, acceleration of the implementation of modern information technologies and communications systems in industries and other segments of the economy, modernization of the telecommunication infrastructure and data networks, coordination and support for the development of

competitive software products and services, introduction of modern software. The Ministry has the functions of government regulation, licensing and control activities in telecommunication, as well as the use of radio frequency spectrum.

5.2.Institutional reform and independent regulatory authorities

A very important element for the effective functioning of the ICT market is the establishment of regulatory bodies. The last decennia have seen an unprecedented global trend of countries establishing independent regulatory authorities for the ICT/telecommunication sector. There were only 14 such regulatory agencies in 1990, 86 in 1998 and 124 in 2002. As of mid-2013, there were 161 countries with independent regulatory bodies.

All EU countries have completed the process of separation of the roles of (1) policy making (government), (2) sector regulation (regulatory agencies) and (3) ownership and management (private sector). As part of the liberalization process, almost all countries in South-Eastern Europe (SEE) have also established an independent regulatory authority that meets the conditions defined in the EC Directives.

In order to encourage innovation, ensure future growth and sustainable development, the regulator needs to be granted sufficient flexibility and autonomy in decision-making and enforcing legal and regulatory instruments. Independence of the regulatory body involves at least three key elements: (i) structural separation of the of national regulatory authorities (NRA) from the regulated firms, (ii) isolation of the NRA from arbitrary political intervention and (iii) functional effectiveness assured through adequate human and financial resources and enforcement powers. The two latter aspects of NRA independence require to limit political interference in the day-to-day duties of NRAs, to set predictable and transparent rules for the appointment and dismissal of NRA management, and to ensure that NRAs have own independent budgets and sufficient number of qualified staff.

Following the general trend and market liberalization five out of 10 ECO Member States have created independent regulatory authorities. In the other five countries the regulatory functions are performed by the sectorial Ministry or other policy-makers. The table 17 below indicates the authorities with regulatory functions in the ECO region and the year of establishment.

Table 17. Regulatory authorities ECO countries

Country	Regulatory Authority	Year of establishment
Afghanistan	The Afghanistan Telecommunications Regulatory Authority (ATRA)	2006
Azerbaijan	The Regulatory Department within the Ministry of Communications and High Technologies	
Iran (I.R.)	The Communications Regulatory Agency	2003
Kazakhstan	Communication, Informatization and Information Committee of the Ministry for Investment and Development of the Republic of Kazakhstan	
Kyrgyzstan	The State Agency for Communications under the	2012

	Government of the Kyrgyz Republic	
Pakistan	Pakistan Telecommunication Authority (PTA)	1997
Tajikistan	The Communication Service under the Government of the Republic of Tajikistan	
Turkey	The Information and Communication Technologies Authority (ICTA)	2000
Turkmenistan	The Ministry of Communications, under the Cabinet of Ministers	
Uzbekistan	the Ministry of Development of Information Technologies and Communications	

ICT Regulatory authorities in ECO Member states

The key benefits from independent regulators are to shield specific economic sectors from short-term political interventions in order to ensure long-term market stability and economic objectives, and to avoid the influence and capture by particular interests, either by the entities being regulated or other non-governmental groups. Such regulators are expected to ensure market discipline, protect consumer interests, facilitate open access to the core infrastructure of the network, at the same time stimulating investments in the networks and services and preserving social objectives. The independence of regulatory agencies from direct political intervention has often been cited as an essential requirement for building trust among investors in newly liberalized sectors.

By mid-2003 the Government created a Telecommunications Regulatory Board (TRB) in Afghanistan within the MCIT to oversee the regulatory aspects of the sector. After the adoption of the Telecommunications Services Regulation Law in 2005, TRB was restructured in the Afghanistan Telecommunications Regulatory Authority (ATRA), established in 2006 as telecommunications sector regulator with an independent organizational structure with separate budget and operating within the political framework of the MCIT. ATRA' objectives are the implementation of the national policy and market liberalization in telecommunications sector, providing further access to telecommunication services throughout the country, promotion of non − discriminatory entry of operators to the market, strengthening telecommunications market in order to promote quality of its services in the country. According to the Law, the Regulatory Authority has the functions of licensing, tariffs and interconnection regulation, scarce resources management, monitoring and control of the service quality and compliance to the rules and regulations by the service providers. While performing these functions ATRA issues, modifies, renews, suspends or revokes licenses and permits, assigns radio frequencies in accordance with the national frequency allocation table, establishes and maintains the numbering plan and assigns numbers, solves users' complaints and settles disputes on interconnection, access to and quality of service, numbering, privacy, interference and quality of the networks or services.

In order to implement the Communications Regulatory Commission's decisions of Iran and to achieve the sector goals in the area of radio communications the Communications Regulatory Agency (CRA) was established in 2003 based on Article 7 of the Act of Duties and Powers of the Ministry of Communications and Information Technology of Iran, by combining the roles and functions of the Deputy Minister for Telecommunication Affairs and the Directorate General of Telecommunications of the Ministry. The Communications Regulatory Agency is a state organization, affiliated to the Ministry of

Information and Communication Technology. Its aim is to reform and restructure of the country's communications network, as well as supervise and execute powers of the Ministry of Information and Communication Technology in the sector of radio and communication regulation, as a supervisory body, and ensure competitive telecommunication market by promoting and optimizing the quality of services. The CRA has legal entity and its own budget. The main CRA goal is the establishment of competitive and balanced market for providing new and comprehensive ICT services within reasonable cost as part of the overall infrastructure for the State development. CRA is responsible for the regulation and issuing of licenses for telecommunication, information technology and postal services, licensing for the establishment and operation of radio networks, management of limited resources. It is responsible for protecting consumers' interests and supervising and inspecting active communication service providers, market environment control and standards application, regulation and rules of quality control and type approval in providing services and exploitation of telecommunication and IT networks. CRA also issues the licenses for the import services, purchasing, selling and production of radio equipment, and licenses for importing telecommunications and computers, network goods and equipment. The other CRA's duties refer to running the secretariat and supervising over the execution of Communications Regulatory Commission decisions.

The Telecommunications Authority of Turkey was established in 2000 and was the first sectorial regulatory body of the country. On 10 November 2008 the Electronic Communications Law No. 5809 came into force and the name of the Authority changed to Information and Communication Technologies Authority (ICTA). This law introduced a clearer distinction between the competencies of the regulator, ICTA, and government ministries and stipulated ICTA's independence. ICTA is the public legal entity with administrative and financial autonomy, having special budget, separate from the Ministry and operators, and responsible for carrying out tasks defined under the Electronic Communications Law No. 5809 of 5/11/2008. According to the Law No. 2813 ICTA is acting independently, while performing its duties. No body, authority, institution or person can give orders or instructions to ICTA. The regulatory objectives of the sector are to create effective competition, ensure the protection of the consumers' rights, promote the deployment of services throughout the country, ensure efficient and effective use of the resources, promote the new investments and technological developments in communications infrastructure, network and services through regulations and inspections in electronic communications sector and determine relevant principles and procedures thereto. ICTA adopts and manages regulations necessary for the implementation of the legal provisions, strategies and policies set out by the Ministry of Transport Maritime Affairs and Communications regarding electronic communications. Within its competencies ICTA is setting provisions and conditions for authorizations regarding electronic communications services, network and/or infrastructure, determining the procedures and principles concerning access including interconnection, right of way and national roaming, managing and monitoring of the radio spectrum, allocating satellite position and numbering recourses, determining criteria, procedures and principles regarding tariffs, carrying out analyses of the relevant electronic communications markets and imposing regulatory obligations on operators designated as having SMP, protecting the rights of users and end-users, doing inspection and arbitration.

The Pakistan Telecommunication Authority (PTA) was established under the Telecom Re-organization Act 1996 and has the duty to regulate the establishment, operation and maintenance of telecommunication systems, and the provision of telecom services. PTA regulates the establishment, operation and maintenance of telecommunication networks and the provision of telecommunication services; determines the terms of interconnection; develops national telecommunication numbering plans; regulates tariffs for telecommunication service; carries out inspections, investigates and adjudicates on complaints, promotes and protects the interests of users of telecommunication services. PTA has the duty to grant, modify,

monitor and enforce licenses for telecommunication networks and service, regulate the transfer of licenses, receive applications for the use of radio frequency spectrum.

The State Agency for Communications under the Government of the Kyrgyz Republic is the regulatory authority in telecommunications and postal communications. The history of the establishment of the regulatory authority in Kyrgyzstan starts with October1997, when the National Agency for Communications of the Kyrgyz Republic was created and which subsequently has undergone several transformations. The latter was due to the changes in structure of the Government which led to the reorganization in 2009 of the National Agency for Communications into the State Agency for Communications under the Government of the Kyrgyz Republic. The regulator lost its status as a "national" agency, becoming a "state" communications agency, understood to be of a lower status within the government structure. The work of the State Agency for Communications is supervised by the First Deputy Prime Minister of the Kyrgyz Republic. The regulatory authority is working under the Law on Telecommunications and Postal Communication and the Regulation on the State Agency for Communication under the Government of the Kyrgyz Republic approved by the Government Decision of the Kyrgyz Republic No. 124 of 20th of February 2012.

Institutional features and decision making of the regulator

The institutional design or the way in which institutional features are structured determines to a large extent the independence of the regulatory bodies. Status of the head and the members of the board (or commission) of the regulators, the nomination and dismissal process for the heads of the independent regulatory agencies, as well as how the decisions are taken is also a relevant criterion.

The appointment procedures for the NRA management in ECO Member States vary from country to country with the appointment: (i) by government only (Pakistan, Turkey, Kyrgyzstan), (ii) by president following the Minister proposal (Afghanistan), or (iii) by the Minister only (Iran). In Turkey, following a nomination procedure involving industry, consumer bodies and the relevant ministry, the board members of the ICTA are appointed by the Council of Ministers. The Chairman of the Board in Pakistan is appointed from among three members of the board by the Federal Government.

The board of the Regulatory Authority in Pakistan consists of three members, in Afghanistan there are five members of the board and in Turkey - seven members. The CRA is headed in Iran by the president and in Kyrgyzstan is led by the director. There are no boards in these countries.

The office term of the board members is four years in Pakistan, with the possibility of one renewal, and five years in Turkey, where there are no restrictions on reappointment. In Afghanistan there is no term of office for the board members and in Iran the president of the CRA is appointed for an indefinite period. The director and deputy director of the Agency in Kyrgyzstan also have unlimited term of office.

In Afghanistan, Iran and Kyrgyzstan the grounds for discharge and dismissal of board members or head of the Regulatory Authority and procedures for clarification and appeal against dismissal are not stipulated by Law. In Pakistan and Turkey the grounds for discharge and dismissal of board members are rather similar, mostly listing the following specific situations: (i) inability to perform duties; (ii) serious illness (iii) criminal conviction; (iv) professional misconduct and/or abuse of the position; and (v) corruption and/or conflict of interest.

In Afghanistan, Pakistan and Turkey the decisions of the board are adopted with a majority of votes and every board member has one vote.

In Iran CRA has no right to approve the regulations related to the regulated sector. Besides CRA, regulatory functions, such as licensing, price regulation, numbering assignment, universal service/access regulation are carried out by the Ministry of ICT's and other state bodies.

In Kyrgyzstan the Law on Normative Legal Acts No. 241 of July 20, 2009 deprived the State Agency for Communications of the right to adopt its own regulations. So now the Government approves SCA's regulations. Since 1 January 2011 all the regulatory documents approved by the National Agency for Communications and subsequently the State Agency for Communications have become null. The same Act requires that a regulatory impact analysis be produced by a separate ministry for each new regulation proposed by the State Agency for Communications that impacts business interests. This regulatory impact analysis must be reviewed by the Ministry of Economy (ME) and then by a commission approved by the government. Only after that a draft regulation can be further consulted with other various ministries and agencies before it can be approved by the Government. This process makes it extremely difficult for State Agency for Communications to adopt in time effective regulations.

In Pakistan the Federal Government may issue policy directives to PTA on the matters relating to telecommunication policy especially on the number, term of the licenses for public switched networks and international telecommunication services, framework for the telecommunication sector development, scarce resources. The Cabinet may issue any other policy directive on any matter related to the telecommunication sector,

- **Afghanistan**

ATRA' 5 members of the Board are appointed by the President at the proposal of the Minister. No term of office is established. The President of the country can dismiss the members of the Board and issue a decree of dismissal. The ATRA makes a final or interim decision. The final decision is effective [retroactively] from the date on which the interim decision was made. The decisions made by ATRA are applicable. A person aggrieved by an ATRA decision can appeal to the Commission for Settling Financial Disputes [Financial Services Tribunal].

- **Iran**

The president of the CRA, who is also the Deputy Minister of Information and Communication Technology and Secretary of the Communications Regulatory Commission is assigned by the Minister and is the Chief Executive Officer of the CRA. The president of the CRA performs all administrative, financial, employment and executive affairs of the CRA. No board in CRA.

- **Turkey**

The decision-making body of ICTA is the Board, consisting of seven members, including a Chairman and a Vice Chairman. The Chairman is also responsible for the management and representation of ICTA.

Board members are appointed for a period of five years by the Council of Ministers. They are nominated as follows: Chairman of the Board, one member that represents the wireless services, one member that

represents the telecommunication services and one member that represents postal services are proposed by the Ministry of Transport Maritime Affairs and Communications. The two members representing telecommunications sector are selected by operators having at least 10 % share of telecommunication market in Turkey, one member representing consumers is selected by the Ministry of Trade and Industry and the Union of Chambers and Stock Exchanges of Turkey.

There are no restrictions on reappointment. The Board members can be dismissed before the completion of their term by the Council of Ministers because of their inability to work, due to serious illness, professional misconduct or criminal offences.

The decisions or the regulations are approved by the Board. The Board convenes with the participation of at least a total of five members and takes decisions with the affirmative votes of at least four members.

Appeals against ICTA regulations and Board decisions can be brought before the Council of State, the highest administrative court in Turkey. Appeals against regulatory decisions are decided by courts (Council of State or Administrative Court).

- **Pakistan**

Board consists of three members one of which is a professional telecommunication engineer and the other is a financial expert. They are appointed by the Federal Government for a term of four years and are eligible for appointment for a similar term or terms. The Chairman of the Board is appointed from amongst three members by the Federal Government. A member of the Board can be dismissed before the completion of the term by the Federal Public Service Commission, if was proved that is unable to perform the functions of his office because of mental or physical disability or misconduct, including corruption and dishonesty.

In Pakistan a person aggrieved by any decision or order of the PTA on the ground that it is contrary to the legal provisions can appeal to the High Court or to any other tribunal established by the Federal Government for that purpose.

- **Kyrgyzstan**

The Agency is headed by the director, who is appointed and dismissed by the Prime Minister of the Kyrgyz Republic. The deputy director is appointed and dismissed by the Prime Minister of the Kyrgyz Republic on the proposal of the Director of the Agency. There is no Board and no established term for the appointment of the director and deputy director. In Kyrgyzstan decisions of the regulatory agency can be appealed to court, as well as to Government, the Prosecutor's Office, or Parliament, providing operators different options to challenge the regulator's decisions. Appeals to court are based on procedures specified in the Civil Code and the Code of Civil Procedure.

Budget

Budgetary autonomy is a significant practical dimension for independence of the regulator. In all five countries the regulators have separate funds and accounts. The regulators' budget is created from several sources, including state or public funds, fees imposed on the regulated industry: regulatory, licensing, numbering and spectrum fees, monitoring fees and fines levied on operators, etc. Not all regulators have

the right to approve their budget. In Afghanistan the Ministers Committee approves the regulator' budget, while in Iran the CRA' budget is approved by the Management and Planning under the Presidency and in Kyrgyzstan the budget is required to be coordinated with the Ministry of Finance.

In Afghanistan ATRA's administrative costs are fully recovered on the basis of regulatory, licensing and spectrum fees that are paid by the sector providers. Its budget is approved by Minister Committee.

The Law in Iran declares the financial independence of the CRA. The budget required for the CRA is annually predicted and provided through the public credits and funds, out of the Ministry of ICT's budget, as a part of national annual budget bill. The sources of regulator's budget are license fees (41%), Government appropriation (10%), and regulatory fees (3%), USO (46%). The fees imposed on the regulated industries are approved by the Government and Parliament. The CRA budget is approved by the Management and Planning Organization, reporting to the Presidency. The president of the CRA performs financial affairs of the CRA.

ICTA of Turkey has independent sources of finance, including annual administrative charges collected from the operators (an amount not exceeding the 0.5 % of the previous year's net sales of the operators), numbering and frequency fees, fines levied on operators and revenues obtained through consultancy and training. Any surplus at the end of the year is transferred to the Treasury. The accounts of ICTA are audited by the Turkish Court of Accounts, the Ministry of Finance and the Council of Inspectors of the Prime Minister.

There is a "Pakistan Telecommunication Authority Fund" which is prepared and used by the PTA for all its expenses and charges related to its functions, including the payment of salaries and other remuneration to its employees. The prepared PTA's own budget is submitted yearly to the Federal Government for information. The Fund is financed from fees and other amounts received by PTA, grants from the Federal Government and the Provincial Governments, sale proceeds of bonds issued under PTA of the Federal Government and loans. Any surplus is transferred to the Federal Consolidated Fund and any deficit is covered by the Federal Government. The accounts of PTA are audited at the end of each financial year by the Auditor-General of Pakistan. Auditor-General's report on the accounts is provided to the Federal Government and is publicly available.

The State Agency for Communications of the Kyrgyz Republic has its own budget, which is formed independently from other government bodies. The Fund for the maintenance of the State Agency is formed from fees that the regulated entities pay annually, representing 0.9 % from their revenue of licensee activity, of which 60% must be transferred to the Republican budget; fees for the oversight of the radio spectrum use; fees related to certification and other charges, fees, and grants. The financial resources are transferred to the account of the State Agency for Communications, however in order to be able to spend money, a coordination of the budget is required with the Ministry of Finance. This procedure involves a certain financial dependence of the Regulator.

Staffing

Human resources requirements are another determining factor for the agencies' independency. Independent regulatory authorities need to be able to recruit staff with the appropriate qualifications, to establish their authority and independence, and to match the technical competence of the regulated parties.

ATRA' board and Ministers Committee are in charge of the agency's staffing recruitment, internal structure and composition and the salary allocation. The Regulator's staff is exempt from civil service salary limits.

CRA in Iran cannot set its own structure. The organizational chart is provided and takes effect upon the proposal of the Minister of ICT and approval of the Vice-Presidency for Management and Human Resources Development Affairs. The president of the CRA performs all administrative, executive and employment affairs of the CRA.

PTA of Pakistan is in charge of the agency's staffing recruitment and removal of its employees, managing internal organization, setting up divisions within PTA and making appropriate appointments to those divisions. The members of the Board and employees are public servants and are not exempt from civil service salary limits.

In Turkey the total number of the ICTA staff is 805 together with the regional branches. The Chairman of the Board manages the Authority. The staff is employed on the basis of a contract. According to the Law No 2813, the Chairman of the Board is provided with a monthly salary that is equal to the salary paid to the Undersecretary of the Prime Ministry including all kinds of payments, financial and social rights. The members of the board are paid according to the same procedures and principles provided that their payments do not exceed the payment of the Chairman of the Board. Salaries and other financial rights of the staff are determined by the Board taking into consideration the hierarchy within the institution.

The Director of the State Agency for Communications of Kyrgyzstan approves the structure, cost estimates and staffing of the Agency. He recruits and dismisses the staff. At the end of 2014 in the Agency there were about 150 employees who are public servants and salaries are set by the Government.

Reporting and transparency

Public consultation and publishing the regulatory documents and decisions, as well the periodical reports on market development and regulatory activity are the key regulatory tools employed to improve transparency, efficiency and effectiveness of regulation. Consultation improves the quality of rules and programs and also improves compliance and reduces enforcement costs for both governments and citizens subject to rules. Public consultation increases the information available for government policy-making. Performance assessment and financial audit are crucial for the justification of the regulatory agency's mission and existence.

ATRA is responsible by Law to make public and publish on the relevant website all policies, regulations, license conditions, interconnection agreements, tender qualification and scoring criteria, quality of service reports and other documentation required for full transparency and to ensure a 'level playing field' for all market participants. ATRA exposes to the public consultation the drafts of the regulations and interested parties are allowed to make submissions to the regulator on matters under review. The regulator organizes public consultations with interested groups. ATRA has the obligation to prepare and, through the MCIT, deliver to the Council of Ministers an annual report containing financial details pertaining to the activities of the ATRA for the preceding year. ATRA's financial and performance audit are performed by the Supreme Audit office.

CRA has the duty to draw up and publish a periodical report regarding the status and quality of providing telecommunications, postal and information technology services throughout the country, together with

regional and international comparative assessment. The CRA reports to the Parliament and submits annual report to the Ministry of ICT.

Every year PTA submits an activity report to the Federal Government and the National Assembly, including action taken for the protection of consumers' interests. Under section 18 of the Pakistan Telecommunication (Re-organization) Act 1996 the reports of PTA can be scrutinized and examined by Public Accounts Committee and Federal Government.

ICTA has no legal obligation to organize consultations. Meetings of the Board are deemed confidential. However, the decisions which the Board considers appropriate to be announced are informed to the public through appropriate ways, mainly Internet. The regulatory decisions considered appropriate by the Board, are sent to the associated Ministry and Prime Ministry to be published in the Official Gazette. ICTA is not supposed to report its activities to another body. However, ICTA publishes its annual reports. The audit of ICTA's activity is performed by Court of Accounts in accordance with Article 5/13 of the Law No 2813. This is both a financial and performance audit, which is also regulated under the Court of Accounts Law No:6085.

The director of the State Agency for Communications reports on the activities of the Agency to the Government of the Kyrgyz Republic. The information on the Agency activities, the state of the market communications and the decisions of SCA concerning operators and consumers are published on the Agency's website (www.nas.gov.kg) and are distributed through social networks. SCA does not conduct public consultations before taking regulatory decisions.

6. Regulatory reform: adapting regulatory framework to the rapidly changing market, technology development and convergence

6.1. New regulatory models for convergence

Convergence between telecommunications, radio communications and Internet networks and services and their technologies, which is one of the most important trends in the ICT development, leads to searching new models of regulation to keep the pace with market and consumers requirements. In this respect the obvious advantage is that a converged network increases efficiencies in the provision of services and the use of scarce resources, like spectrum, high-speed broadband allows the development of new value-added or "over-the-top" (OTT) services. OTT content and service providers are offering a large numbers of applications and developing new revenue sources. Under such conditions, the regulators should apply the regulatory tools that ensure the sustainable development of the ICT sector which is essential to attracting the investments needed in a digital environment. The adoption of the regulatory framework that eliminates the barriers to new entrants, ensuring the inclusion of competitive provisions that guarantee a healthy relationship between all authorized players in the relevant market (operators, Internet providers, OTT providers, etc) is a way to promote the deployment of next-generation broadband networks and access to online applications and services.

Licensing plays an important role in the access to and development of the market. This requires the establishment of an authorization system covering all networks and services in a similar way regardless of the technologies used. At different stages of market development licensing regime should be applied properly. In the early days of liberalization, the second generation regulation was focused on creating competition in different market segments by separating the licensing of mobile, fixed, Internet and international services.

Third-generation regulation moved to unified licenses, which were implemented in Singapore, Australia, Nigeria, Kenya, Egypt and a number of EU Member States.

Technical advances and the pursuit of the IMT standards allowed different wireless transmission technologies to be used in the same frequency bands. As a result, unified licensing has allowed any company wishing to provide telecommunication services to do so using any technology and offering any type of service, whether it is fixed, mobile, data or Internet. The unified license also includes the requirements for consumer protection, quality of service, coverage, interconnection, competitive behavior and lawful interception.

Under the conditions of convergence a technology-neutral approach is often needed to support sound and sustainable competition. The unified licensing is one such kind of approach. One example is the "general authorization regime" developed by the OFCOM in the United Kingdom. This approach has also been set out in the EU's directive on authorization of electronic communications networks and services *(Directive 2002/20/CE)*.

The core innovation is the replacement of individual licenses with general authorizations, while another regulatory framework still exists for the use of radio frequencies and numbering resources. In other words, the operator might be required to submit a notification to regulatory authorities, but it may not be required to obtain an explicit decision authorizing it to offer the service. There is a clear distinction, however, between operating under a general authorization and having the right to use scarce resources such as radio frequencies and numbers. Broadcasting or content production and distribution could be subject to a similar approach.

Another issue that requires the attention of the regulator are radio frequencies. Spectrum was always a key resource for the development of the ICT sector and services, including mobile, wireless broadband and satellite communications, television and radio broadcasting. But in the last decade, characterized by the rapid development of wireless broadband technologies, radio spectrum has become even more important. Wireless broadband could contribute substantially to the economic recovery and growth if sufficient spectrum is made available. The remarkable growth in smart phones and tablet devices has led many governments to allocate new spectrum bands to mobile communication uses.

The International Telecommunication Union's (ITU) World Radio communications Conference will take place in Geneva in November 2015 (WRC 2015). Spectrum issues are already being examined during the preparatory meetings before the start of the conference. Previous WRC decisions facilitated the reallocation of the "digital dividend" band (700 MHz or 800 MHz, depending on the region). The ITU has developed a methodology to estimate the spectrum needs of countries, which takes into account technological evolution and communication uptake.

Many countries have included as one of their priority to increase the amount of spectrum resources for the ICT development. In this respect, they have engaged in important efforts such as digital dividend and other initiatives. This task includes the production of spectrum inventories, outlooks and roadmaps. Spectrum inventories document every band, including its current use and occupation, while spectrum outlooks and roadmaps specify the needs of a given country and region. There are a broad range of circumstances to consider, such as possible harmful interference, current uses of spectrum such as civil or defense use, and so forth.

Ensuring the optimal use of spectrum may require innovative solutions such as collective use of spectrum (spectrum sharing) and introduction of general authorization regime, applying technology and service neutrality in the use of spectrum for ICT networks and services. However, spectrum management may affect competition by changing the role and power of market players, if existing operators receive undue competitive advantages. Limited spectrum access, in particular when appropriate spectrum becomes scarcer, can create a barrier to entry for new services or technologies and hamper innovation and competition. Acquisition of new usage rights, including through spectrum trading or other transactions between operators and the introduction of new flexible criteria for the use of spectrum can have an impact on the existing competitive situation.

The importance of spectrum trading, transferring or leasing, is that it allows adapting to the market evolution and increasing the efficient use of spectrum, as well as developing the market for wireless networks and services. In order to avoid distortions of competition appropriate ex-ante or ex-post regulatory measures should be taken, such as action to amend existing rights of use, prohibit certain acquisitions of spectrum rights, and impose conditions on spectrum hoarding and efficient use in such a way as to limit the amount of spectrum for each operator or to avoid excessive accumulation of spectrum.

Also one of the new options for more flexible approach in radio frequencies usage may be the various forms of "sharing", as spectrum may be shared in various ways based on time, space and geography.

Licensed shared access (LSA) enables spectrum sharing by two or more entities in a given area or time interval for a particular band, and also includes licensing requirements for those potentially capable of using the shared band. In 2011, an industry consortium put forward a proposal to share spectrum based on licensed or authorized shared access. Existing spectrum users (the incumbent) share spectrum with one or several licensed LSA users (licensees), in accordance with a set of conditions, which can be static (time allowed or exclusion zones) or dynamic. Dynamic use could apply the recent advances in dynamic spectrum techniques. Under LSA, the new users are authorized to use the spectrum in accordance with the sharing rules included in their rights of use (license), while ensuring the use by the long-term incumbent.

Recently the FCC has put forward a notice for proposed rulemaking (NRPM) to adopt a licensed shared access approach in the 3.5GHz band ("the Citizens Broadband Radio Service"). In Europe, the CEPT and the Radio Spectrum Policy Group (RSPG) have adopted LSA to foster spectrum sharing for IMT and other bands, in a harmonized manner. The first band where LSA could be implemented is 2.3-2.4GHz, where it would enable shared use by the incumbent (the military) and new users (telecommunication operators).

In the OECD countries, one of the most common schemes for spectrum sharing is unlicensed spectrum. Here no single entity has a license for that part of the spectrum and it is allocated for open use. There are, of course, rules, including technology restrictions and power level limitations, to avoid interference. A completely open system may have risks associated with a "tragedy of the commons". However, the outstanding success of Wi-Fi and wireless LAN indicates that this approach has merit when considering efficient and flexible use of scarce resources and further technological developments may enhance the application of shared spectrum.

In reviewing their spectrum management policy, policy makers and regulators need to ensure that available and underutilized spectrum is rapidly made available for the benefit of users, and that rules to manage interferences are in place. Efficient and effective use of the radio frequency spectrum may be made by considering, wherever applicable, a new generation of auctioning or allocations and permitting

flexible use of spectrum. By leveraging the "digital dividend" spectrum, the footprint of mobile broadband access can be extended, while "white spaces" can be available for unlicensed use enabling broadband services.

During the past few years, a primary objective of spectrum management was to maximize revenues to the regulatory agency or the national treasury. One option for the fourth-generation regulators may be to treat spectrum as a wholesale commodity, charging a rent for its use but not requiring operators to spend considerable capital resources to "buy" licenses. In fact, this would move spectrum from a capital expenditure (CapEx) to an operational expenditure (OpEx) and off the balance sheet – reserving operators' capital for infrastructure investment. Such a move would financially assist operators, enabling them to roll-out new infrastructure and allowing them to provide lower-cost services to consumers. If operators were not effectively using the spectrum, then they would lose the right to use it.

Convergence and competition

Competition in the ICT markets is also affected by increasing convergence. During the recent years, trends in convergence have been observed mainly between fixed and mobile networks (i.e. joint provision of fixed and mobile communication services), and between telecommunications and television service offers, with market players tending to offer triple-play services (voice, video and broadband). More recently, convergence between telecommunications offers and over-the-top (OTT) services from application-based companies (e.g. Facebook, Netflix, Spotify) have begun to pose new challenges to current regulatory frameworks. Convergence, whether between fixed and mobile, telecoms and broadcasting or telecoms and OTT, inevitably leads to service bundles. These enable consumers to benefit from integrated offers, but may lead to the exclusion of other operators unable to offer the full range of services. This situation calls for regulators and competition authorities to advance regulatory reform in order to apply the same rules if similar services are being provided, thus guaranteeing technological neutrality. Since the principle of technological neutrality would suggest that similar services should operate under the same rules and conditions, its implementation poses significant challenges to most current regulatory frameworks, as the Internet and traditional television broadcasting services stem from radically different environments and OTT services are typically not included. In cases where bundling incorporates goods that have an important level of market power (e.g. premium television content) and bundles could become a serious source of competition concern, regulators have applied ex-ante regulation. For example, in the United Kingdom, the Office of Communications (Ofcom) imposed a wholesale obligation on the leading pay television provider, Sky, to offer its wholesale sports channels at regulated prices to third party providers.

Protection of competition

Ex-ante regulations are a tool for restricting abusive behavior of the dominant or significant market power operators. There is a need for *ex ante* obligations in certain circumstances in order to ensure the development of a competitive market, but it is essential that *ex ante* regulatory obligations should only be imposed where there is no effective competition, i.e. in markets where there are one or more operators/providers with dominant or significant market power. Regulators conduct market analysis to assess the market situation in a converged environment, in order to identify operators with dominant or significant market power and stimulate competition in the market. Regulator should analyse whether a market is effectively competitive and this should include an analysis as to whether the market is prospectively competitive, and thus whether any lack of effective competition is durable. Regulators

should ensure that the principles of fair, equal and non-discriminatory treatment of all market players continue to prevail and foster a level playing field among regulated and unregulated players.

It is also necessary to mention that in the growing digital environment, fourth-generation regulators are deeply involved with the consumer protection and should have the highest level of transparency and openness, as well as provide multi-stakeholder consultations on regulatory matters. Regulators should also empower consumers so that they could make informed decisions. This can be through the development of online tools to check speed, quality of service and price of access, which is another way to foster competition. Regulators have a role to play in building the consumer trust and protecting security of services by appropriately addressing data protection, privacy and cybersecurity matters.

Competition and open access

Following the liberalization of telecommunication markets, regulators used open access as a tool to curtail bottlenecks. Across many countries, following a century of monopolies, regulators use some type of "open access" to drive competition in fixed markets through the use of regulatory tools such as unbundling of local facilities, local loop unbundling, wholesale broadband access and line-sharing. Regulated access has usually included certain conditions that incumbent operators must meet, such as service level agreements, delivery times and, above all, price obligations. The scope for wholesale open access in fixed networks does not only affect products and services, such as access to the local loop or wholesale service at higher levels of the network (e.g. bitstream). Key access products, such as dark fiber services, access to ducts or, especially, access to in-building wiring, play a major role and need to be taken into account by policy makers and regulators as they may represent a major barrier for the entry of alternative operators.

Rights of way and infrastructure sharing

Telecommunication operators often encounter barriers when deploying infrastructure. These include the need to request rights of way, access to third-party facilities, environmental permits, problems with the deployment of masts, poles, towers, and so on. It may take several months (sometimes even a year) to obtain permits to deploy infrastructure, and the eventual outcome is uncertain. This barrier to network deployment is further aggravated by the lack of harmonization across municipalities over rights of way. Urban planning rules differ significantly from city to city, and each municipality can ban tower deployments at its will. Such obstacles impact coverage.

Regulators should encourage network and facility sharing through soft measures such as cross-sector infrastructure mapping that enables the coordination of civil works. There are two main types of infrastructure sharing: passive and active. Passive infrastructure sharing covers the sharing of network elements such as masts, sites, cabinets and conditioning. Active infrastructure sharing includes the common use of equipment in the access network such as antennae, nodes and radio network controller elements (which may include spectrum). Operators share passive infrastructure in all European Union member countries. Some sharing agreements are commercially driven (e.g. Denmark and Hungary), while others are encouraged by the authorities (e.g. Finland, Italy and Portugal) or decided by the telecom regulator (e.g. France, Netherlands, Spain) (BEREC, 2011).

The principal benefits of passive sharing are significant cost savings for operators and increased geographical coverage for users. For example, according to some industry analysts, wireless infrastructure sharing saves operators 30% in capital expenditure and 15% in operating expenses (Analysys Mason,

2010; BEREC, 2011). Cost savings are usually sufficient to encourage industry agreements to engage in network sharing. The main drawbacks of sharing are a reduction in the operator's incentives to invest in its own network.

The 4th generation regulator needs to adopt a "light-touch" approach, calling for regulatory intervention only when necessary, while ensuring that market forces work without constraints and towards innovation within the prescribed national legal environment. Regulators should continue to ensure regulatory predictability, facilitating the adoption of a regulatory solution collectively developed and administered by the regulator and the industry.

Regulators should work with other interested stakeholders (from other sectors) to reduce or remove barriers to broadband infrastructure roll-out.

The fourth-generation regulation, characterized by agility and flexibility, has gained momentum rapidly over the past decade. The number of countries with 1G and 2G telecom regulation has halved in only seven years, reducing from three-quarters to just one-third of countries over that period. Indeed, today, one out of the four surveyed countries enjoys a 4G regulatory environment that allows for leveraging of the ICT sector to achieve economic growth and social development across the economy (see Figure 11).

Figure 11. The four generations of telecom regulation, 2007-2013
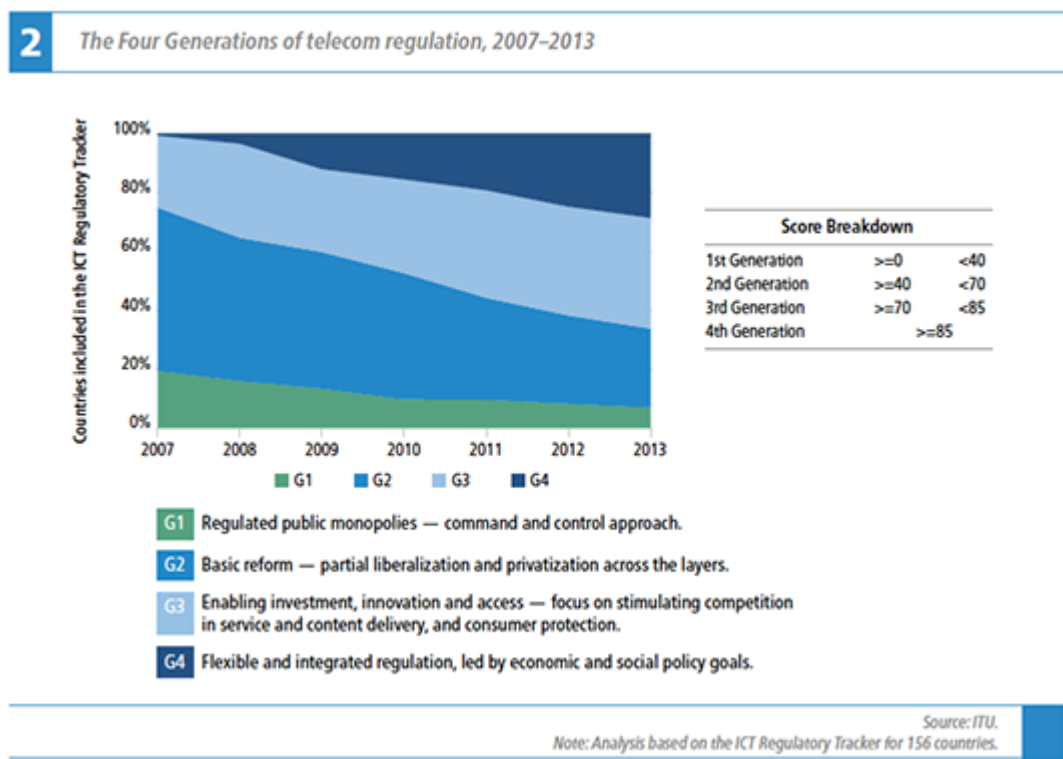
* Note: The 15th edition of the ITU flagship report, Trends in Telecommunication Reform

Regulators can now be seen as facilitators, or even partners, in promoting development and social inclusion. Innovative and smart regulatory approaches can foster equal treatment of market players without placing an extra burden on operators and service providers.

Some of the guidelines for the 4th generation regulator behavior include:

- adopt a "light-touch" regulatory approach, intervening only when necessary, while ensuring that market forces work without constraints and in favor of innovation;

- ensure that the principles of fair, equal and non-discriminatory treatment of all market players continue to prevail, fostering a level playing field among regulated and unregulated players;

- apply administratively simplified and flexible models to facilitate market entry and stimulate competition and innovation;

- conduct market analysis to assess the situation in a converged environment;

- adopt a regulatory framework that eliminates barriers to new entrants;

- include competitive provisions that guarantee a healthy relationship between all authorized players in the relevant market (operators, Internet providers, OTT providers, etc.);

- empower consumers to make informed decisions through the development of online tools to check download speeds, quality-of-service and prices for access and data plans;

- implement measures to monitor the use of traffic management techniques to ensure that they do not unfairly discriminate between market players;

- encourage network and facility sharing through "soft" measures such as cross-sector infrastructure mapping that enables the coordination of civil works.

- ensure the highest level of transparency and openness, such as by making relevant market data and regulations publicly available;

- encourage multi-stakeholder consultation on policy and regulatory matters;

- continue to ensure regulatory predictability and foster co-regulation wherever possible;

- work with other interested stakeholders to reduce or remove practical barriers to broadband infrastructure deployment.

Fourth-generation regulation is about evolution rather than revolution. It recognizes a re-thinking of ICT regulation to bring about a more flexible and contextual approach to regulating issues at different levels of the sector (networks, services, applications, etc.). It is certainly about a softer and, ultimately, smarter regulation.

- ***Legal basis of the regulatory reform in the European Union***

The European Union (EU) has been an example of regulatory reform by changing the regulatory objectives. During 1987 to 1998 and the last time in 2009, a number of "packages" were alternately adopted in order to update the regulatory framework. This regulatory framework was transposed in more and more countries as they joined the European Union or those being candidate members. The applied approach to regulation in EU extends beyond Europe and has an impact on the regulatory framework adopted by other countries.

The shift to a digital, knowledge-based economy was stressed during the Lisbon European Council of 23-24 March 2000. It emphasized the importance for Europe's businesses and citizens of access to an inexpensive, world-class communications infrastructure and a wide range of services. In 2006

consultations were held and recommendations made regarding the new regulatory framework with the inclusion of new topics and the continuous transition in the European Union to a regulation which is less focused on specific sectors and to a greater degree to a fact-based regulation. It is important to note that these packages of regulations were forcibly aligned to broader policy issues related to outreach, innovation, job creation, growth, energy and environmental protection in the new economy and information society. EU is not alone in this process; most of the ITU Member States have also adopted an ICT strategy.

In 2002, the European Commission (EC) approved a new regulatory framework (NRF) consisting of Directive 2002/21/EC - Framework Directive and four principal specific directives: Directive 2002/20/EC "Authorization Directive", Directive 2002/19/EC "the Access Directive", Directive 2002/22/EC "Universal Service Directive", and Directive 97/66/EC "Data Privacy Directive". The main objectives of NRF are to encourage competition in the electronic communications markets, improve the functioning of the internal market, and guarantee basic user interests that would not be guaranteed by market forces and as a corollary of the lessons of convergence, the NRF is intended to be technology neutral. The convergence of the telecommunications, media and information technology sectors means that all transmission networks and services should be covered by a single regulatory framework.

The Directive 2002/21/CE (Framework Directive) establishes a harmonized framework for the regulation of electronic communications services, electronic communications networks, associated facilities and associated services. While carrying out the regulatory tasks, in particular those designed to ensure effective competition, national regulatory authorities should ensure that regulations are as much as possible technologically neutral. The promotion of competition in the provision of electronic communications networks, electronic communications services and associated facilities and services is another responsibility of the national regulatory authorities. It is also needed to ensure that the procedures and rules of the system of regulation should be transparent, proportionate, fair and non-discriminatory.

A very important element for the effective functioning of the electronic communications market is the establishment of regulatory bodies. The Directive 2002/21/CE formulates requirements and conditions for the establishment and operation of regulatory bodies and lays down tasks of national regulatory authorities and establishes a set of procedures to ensure the harmonized application of the regulatory framework.

The aim of the Directive 2002/20/CE (Authorization Directive) is to create a legal framework to ensure the freedom to provide electronic communications networks and services and to harmonize and simplify authorization rules and conditions in order to facilitate the provision of electronic communications networks and services. It covers authorization of all electronic communications networks and services whether they are provided to the public or not. This is important to ensure that both categories of providers may benefit from objective, transparent, non-discriminatory and proportionate rights, conditions and procedures.

The general authorization of all electronic communications networks and services is the best solution that does not require any explicit decision or administrative act by the regulatory authority and limits the procedural requirements to notification only. An ICT service provider may be required to submit a notification that it is providing services, but it may not be required to obtain a decision or be dependent on any other administrative act by the national regulatory authority before commencing operations under the authorization. The general authorization entitles ICT service provider of electronic communications networks and services to the public with certain rights and obligations of authorized service providers and

the right to negotiate interconnection access to, and interconnection of, electronic communication networks and associated facilities. The Directive 2002/20/CE sets out conditions that may be attached to general authorizations. It only applies to the granting of rights to use radio frequencies where such use involves the provision of an electronic communications network or service, normally for remuneration. The liberalization of the telecommunications sector and increasing competition and choice for communications services go hand in hand with parallel action to create a harmonized regulatory framework which secures the delivery of universal service.

The aim of the Directive 2002/22/EC (Universal Service Directive) is to ensure the availability of good quality publicly available services through effective competition and choice and to deal with circumstances in which the needs of end-users are not satisfactorily met by the market. The Directive establishes the rights of end-users and the corresponding obligations on undertakings providing publicly available electronic communications networks and services. With regard to ensuring provision of universal service within an environment of open and competitive markets, the Directive 2002/22/EC defines the minimum set of services of specified quality to which all end-users have access, at an affordable price in the light of specific national conditions, without distorting competition. The mechanisms for compensation of involved losses are also established (the net costs), associated with the provision of these types of services. The concept of universal service should evolve to reflect advances in technology, market developments and changes in user demand.

The Directive 2014/61/EU of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks hereinafter stated as „Directive on cost reduction", which is enhancement of broadband coverage at Union level.

The aim of this Directive is to facilitate and incentivize the roll-out of high-speed electronic communications networks by promoting the joint use of existing physical infrastructure and by enabling a more efficient deployment of new physical infrastructure so that such networks can be rolled out at lower cost. Re-using the existing physical infrastructures, including those of other utilities, can be significantly more efficient for electronic communications network operators, in particular new entrants, in order to roll-out electronic communications networks, in particular in areas where no suitable electronic communications network is available or where it may not be economically feasible to build-up a new physical infrastructure. Moreover, synergies across sectors may significantly reduce the need for civil works due to the deployment of electronic communications networks and therefore also the social and environmental costs linked to them, such as pollution, nuisances and traffic congestion. Therefore this Directive should apply not only to electronic communications network providers but to any owner or holder of rights to use, in the latter case without prejudice to any third party's property rights, extensive and ubiquitous physical infrastructures suitable to host electronic communications network elements, such as physical networks for the provision of electricity, gas, water and sewage and drainage systems, heating and transport services.

The coordination of civil works concerning physical infrastructures may ensure significant savings and minimize inconvenience to the area affected by the deployment of new electronic communications networks. The operators should be able to have access to minimum information concerning physical infrastructures available in the area of deployment.

All new buildings or buildings subject to major renovation should be equipped with physical infrastructure, allowing the connection of end-users with high-speed networks. All newly constructed multi-dwelling buildings, for which applications for building permits have been submitted after 31

December 2016, are equipped with an access point, located inside or outside the building, and accessible to electronic communications networks providers, whereby connection to the high-speed-ready in-building physical infrastructure is made available. The same obligation applies in the event of major renovation works concerning multi-dwelling buildings for which applications for building permits have been submitted after 31 December 2016.

6.2. Regulatory environment in the ICT sector of the ECO member states

While primary legislation should address fundamental regulatory issues, the details of such issues are better addressed through secondary legislation. However, the essence of the ICT regulation continues to evolve along with new technologies and the emergence of new segments of the ICT market. At this stage of ICT development, convergence has implications for all aspects of regulation. Regulators must establish effective and transparent regulatory regimes that promote a systematic development of the telecommunications sector. Regulatory models have been developed incorporating internationally recognized best practices

- *Access to the market: issuance of licenses and authorizations*

For an easy market access it becomes important to set up the legal and regulatory framework in order to ensure the freedom to provide telecommunications networks and services and harmonize and simplify authorization rules and conditions in order to facilitate the provision of ICT networks and services. It is also important to ensure that both categories of providers, whether they are provided to the public or not, may benefit from objective, transparent, non-discriminatory and proportionate rights, conditions and procedures.

While carrying out the regulatory tasks, in particular those designed to ensure effective competition, national regulatory authorities should ensure that regulations are as much as possible technologically neutral.

Afghanistan

In Afghanistan the legal framework for licensing in telecommunications is the Telecommunications Services Regulation Law (2005). The authority which issues, modifies, renews, suspends or revokes licenses is ATRA. The licensing regime foresees that for each type of services or networks are issued separate licenses. Besides, a spectrum license should be obtained from the MCIT' Spectrum Management Department for activities where the radio spectrum frequencies are used. The validity period of the license differs depending on the type of services: for nationwide fixed-telephony services and mobile cellular service provision (including GSM) the license is issued for 15 years, with an option for renewal; for the provision of Internet services - 10 years. The licenses for mobile services or new and modern technologies are issued via competitive tender. A technology-neutral approach is applied for the development of fixed-telephony networks. This means that licensers are permitted to use technology solutions within the radio frequencies spectrum licensed parameters. The market liberalization in telecommunications sector was in…

An International Gateway Services (IGS) license is required to provide commercial, wholesale or retail international connectivity services. In addition to Afghan Telecom, the mobile cellular service providers are allowed to provide international connectivity services.

There is a two-class system of licenses for Internet Service Providers (ISPs) that consists of international Internet connectivity providers (International Transit ISPs) and local Internet service providers (National ISPs). Local Internet services are open to competition, while the International Internet services are limited to enable the Government to manage network security and content issues.

Annually license-holders have to pay different kinds of license fees. The spectrum usage fees are specified in the license agreement. A fee for a license is based on a percentage of revenues share; all licensed network providers have to contribute with 2.5% of gross revenues to the Telecommunications Development Fund. For instance, mobile cellular service providers have to pay license fees in the amount of 10 percent of gross revenues.

According to the Law full private ownership of telecommunications service providers is allowed and foreign private sector investors may own network services providers in their entirety.

Azerbaijan

The Law on Telecommunications (2005) has no provisions on licensing and refers only to other legislation. The licensing regime of networks, services and activities in the telecommunications field is defined in the secondary legislation and regulations adopted by the sectorial Ministry. The Decree No 782 of 2002 "On Improvement of Regulations of Granting Special Permissions (Licenses) for Some Types of Activities" sets out an individual licensing regime, where specific licenses are required for specific services. A license is required for the provision of fixed - telephone (wire) services, mobile cellular services, mobile communication service of 3rd generation (3G), radio trunk and wireless, IP-telephony and data communications, arrangement of internal and international telecommunication channels. The license is issued for 5 years with the possibility of extension.

The market liberalization in telecommunications sector was implemented in 2009 and currently there are no limitations on the issuance of licenses. New entrants should obtain a license for each type of services. The liberalization of the fixed market began in 2005 with a number of new fixed-line providers. The licenses have been issued for local fixed access services, and these new operators provide their services in Baku. International calls were liberalized in 2008 and national calls in 2009. Some new licenses were issued for national and international call services. Two telecom operators, Azertelecom and Aztelekom have international settlements with foreign operators Internet service providers have the options to use the independent companies Delta Telekom and Azertelecom for international leased capacity. Since the national satellite operator Azercosmos entered market in 2013, the operators and service providers obtained a new alternative to provide international services.

Until 2000 the Internet service providers (ISP) had to have a special permit (license), but then in 2000 the licensing of such services was canceled and any natural or legal person in the country is free to provide such services.

The fees /state duties for telecommunications licenses activities are different, such as for the organization of international telecommunication channels, 3 generation(3G) mobile communication, cellular (mobile) it reaches 11,000 AZN; for phone (wired) is 5,000 AZN; while for IP-telephony (Internet-telephony) is 8,000 AZN; and for data transfer it amounts to 6,000 AZN.

The state license fees range from EUR 2,200 to EUR 11,000. Additionally, operators using spectrum resources are charged an additional fee. Operators are also charged for numbering resources and

equipment certification, these payments being intended for the universal service fund (universal service account). There was no public information on the usage of universal service funds (universal service accounts).

Iran

The legislative framework that defines the principles and rules for licensing of networks, services and activities in the ICT sector is the Act of Duties and Powers of the Ministry of Communications and Information technology, adopted in November, 2003

CRA is obliged to develop the communication network of the country and provide communication and IT infrastructure. For this purposes CRA grants licenses for different types of services and networks in ICT. All activities related to ICT and related markets, excluding the scope of content, are subject to a license or permit and can be processed within the framework of rules and regulations adopted by the CRA. Before providing any intended services, all legal entities should obtain the desired licenses from the CRA within the framework of relevant regulations and start providing services after the preparation of all required items in the license. The licensing rules don't limit the number of the licenses and they can be issued through auctions, bidding or tenders. The licensing framework is moving towards services and networks authorization. The principle of technological neutrality has been considered in new licenses of the CRA such as FCP. The validity period of licenses varies depending on the type of the license. The validity period for an FCP license is 10 years and license can be renewed with the permission of the Commission or the CRA. The license action is countrywide. The licenses being held by acting operators reach the number of 12,867.

In Iran there is a stable a regime based on individual licenses for many types of telecommunications/ICT activities.

Turkey

Although the new Electronic Communications Law came into force in 2008, the general authorization framework and liberalization of local services became effective only in May 2009. So then in 2009 Turkey implemented a general authorization regime for all categories of electronic communications services. The authorization and concession agreements issued before the entry into force of the Electronic Communications Law remained in force until their expiry (due in 2023 for GSM services, in 2029 for 3G services and in 2026 for Türk Telekom). Currently, Turksat (the satellite provider) operates under an authorization agreement, while Türk Telekom and the three mobile operators – under concession agreements.

The legislative and regulatory framework that defines the principles, rules and regulations for licensing in the ICT sector is the Electronic Communications Law No 5809, By-Law on Authorization for Electronic Communications Sector, Regulation on Tenders Concerning Authorization in the Electronic Communications Sector and By-Law on Numbering.

ICTA is the licensing authority in telecommunications sector and determines provisions and conditions for authorizations regarding electronic communications services, network and/or infrastructure, supervises their implementation and conformity to the authorization, performs necessary actions thereof and to take measures as deemed necessary by the legislation.

In accordance with the provisions of the authorization regulations based on the Electronic Communications Law No 5809, general authorization regime is performed by notification or granting right of use. If companies intending to provide electronic communication service and/or installing and operating network or infrastructure, which do not require allocation of scarce resources such as number, frequency or satellite position for electronic communication services, they shall be authorized by means of notification in accordance with the procedures and principles specified under the By-Law on Electronic Communications Sector. If they need allocation of scarce resources, they shall be authorized by obtaining right of use from the ICTA after the notification. The number of right of use shall only be limited when a limited number of operators have to use the scarce resources and for the purpose of ensuring efficient use of these resources. The authorizations given by means of notifications do not have any validity period. The authorizations of rights of use have validity periods of 15 or 25 years. The authorizations of rights of use can be renewed. The territory of the action of the license is only limited for Public Access Mobile Radio Service (local or regional). As of March of 2016 there are 686 acting operators in the ICT sector and they hold 1,088 licenses.

Pakistan

The Telecom Re-organization Act No.XVII of 1996 (Act to provide for re-organization of telecommunication System) establishes the provisions for licensing of networks, services and activities in the telecommunications. According to this Act, PTA has exclusive power to grant licenses in telecommunications. A service-specific individual licensing regime is applied when each type of network or service requires a separate license. The licenses are required for establishing, maintaining or operating any telecommunication systems or providing any telecommunication service, but no license shall confer exclusive rights. In case of WLL or mobile, the number of licenses is limited to availability of frequency spectrum. In case of wire line there is no limitation for licenses number. Cellular mobile licenses are issued for a period of 15 years on nationwide basis and the validity period for fixed telephony licenses is 20 years. After the expiry of the initial or renewed term the license may be renewed on terms and conditions consistent with the policy directive, if any, of the Federal Government at the relevant time. Almost all licenses for the provision of services are granted nationwide, except the fixed Local Loop license which is issued on the telecom region wise. The license fee differs and depends of type of activity: fee for long distance and international license is $ 500,000; fee for each telecom region for fixed Local Loop license is US$ 10,000; fee for telecommunication infrastructure provider license is US$ 100,000; fee for national telecommunication tower provider license is Pak Rs. 100,000. PTA is the body that has the right to withdraw or cancel the license and in these cases there is possibility to appeal to the Honorable High Courts. Currently, there are 99 licensees in the ICT sector out of which 14 are long distance and international licensees, 65 are fixed Local Loop licensees and 18 – infrastructure provider and Telecommunication Tower Provider licensees.

Kazakhstan

In 2012 the amendments were made to the multi-sector Law on Licensing that significantly reduced services for which a license is required. As a result of these amendments, only four services remain subject to licensing in the communications sector. These are national telephone calls, international telephone calls, satellite mobile communication and cellular communication for which a specific standard/technology must be indicated.

A half a year ago, according to the Governmental Decision of the Republic of Kazakhstan No. 543 of July 16, 2015 the Communication, Informatization and Information Committee of the Ministry for Investment

and Development was designated as the licensor in the field of communications and information technology.

Kazakhstan has a regime based on individual licenses for all types of telecommunications activities. The licenses that are granted are typically quite specific in terms of which activities may be carried out and an operator may need several licenses in order to provide a given basket of services.

Kyrgyz Republic

The legislative framework that defines the rules and regulations for licensing of networks, services and activities in the telecommunications consists of the Law on Telecommunications and Postal Communication No. 31of April 1998, and the Law On the Licensing–authorization System in the Kyrgyz Republic No 195 of October 19, 2013. The State Agency for Communications is entrusted with licensing activities in the telecommunication and postal services, has the right to set license conditions and obligations for each public telecommunications operator. The Law on Telecommunications and Postal Communication defines the principles and purposes of licensing in communication: achieving the state policy in the sector, consumer protection, creation and development of networks, systems and communication services, promoting the de-monopolization, business development and competition, attracting investment in the sector.

Legal and natural persons in communication work on the basis of the license (including the license agreement) and the license should not be issued on an exclusive or limited basis, except as provided by the Law, or in the case of restrictions due to scarce resources limitation and other technical reasons.

The Law on the Licensing–authorization System establishes the general activities subject to licensing, the main functions and powers of licensing authorities, the general rules for their implementation. The Law stipulates that a license is required for the following activities:

- telecommunications - local, long- distance and international fixed telephony services, mobile communication services;
- data transmission;
- broadcasting, including the creation of programs, transmission and distribution;
- postal services;
- for the use of the radio spectrum for the provision of telecommunications services and (or) data transmission.

The licenses are issued for an unlimited period of time for telecommunications, data transmission, broadcasting and postal services. The licenses for the use of the radio spectrum are issued for a period not exceeding 10 years. The territory of the action of the license is determined depending upon the characteristics of a particular activity, and may be a separate area and regions, as well as the entire territory of the Kyrgyz Republic. The licenses can be issued through the auction and the tender procedure is established by the Government Decision No 608 of August 27, 2015 "On conducting a pilot auction for the right to conclude the lease agreement for the radio frequency bands 806-811 / 847-852 MHz, 811-816/ 852-857 MHz, 816-821/857-862 MHz.

Currently (based on data as of October 1, 2015) there are 373 acting operators in the ICT sector and 738 licenses were issued.

Market liberalization in telecommunications sector was in 2003. The applied licensing regime in the telecommunications involves the issuance of standard and individual licenses for different types of services and activities of the sector.

Tajikistan

The legislative and regulatory framework that defines the rules and regulations for licensing of networks, services and activities in the telecommunications in Tajikistan consists of the Law on Licensing Separate Types of Activities of May 17, 2004, the Law on Telecommunications No. 56 of May 10, 2002, and Government Decree No.172 of April 3, 2007 on Approval of the Regulation on Licensing of Certain Types of Activities. The Communication Service under the Government of the Republic of Tajikistan is the body authorized to grant, renew, suspend, terminate or revoke licenses; organize and hold tenders and auctions of licenses; allocate radio frequencies and numbering in communications; and control the conditions and requirements of licenses, execution of the terms and requirements for licensing. Article18 of the Law on Licensing Separate Types of Activities determines that activities in the area of electric communication are subject to licensing.

The licensing regime of networks, services and activities in the telecommunications field is defined in the Law on Telecommunications and involves the issuance of two types of licenses: general and individual. All the activities in the telecommunications sector in Tajikistan may be carried out by individuals or legal entities based on general or individual licenses.

The administrative procedure for issuing licenses is established at the legislative and regulatory level. Licenses are valid on the whole territory of the Republic of Tajikistan and are issued for a period from 3 to 7 years (individual license) or a period from 3 to 5 years (standard license) with the possibility of renewal for the same period. At the application for a license no high license fees are being applied. There is a list of 17 different types of services and activities and operators that may need more often to obtain multiple licenses to offer the usual range of services. License holders in the telecommunications sector pay to the state budget on a quarterly basis a contribution of 2.5% of their income. Validity period from 3 to 7 years for individual license is too short for considering investments returns.

Turkmenistan

The licensing in the communications sector is regulated by the Law on Licensing of Certain Types of Activities of July 8, 2008 and Regulations on licensing in communications approved by the Presidential Decree No. 4585 of February 24, 2000. Licensing activity is carried out by the Ministry of Communications and the licenses are issued for around 30 types of activities.

The following activities in the telecommunications are subject to licensing: the provision of local, long-distance and international fixed-telephony services, wireless telephony services; leased lines services, cellular mobile and paging services, data transmission services. The services (works) for the construction of communication facilities and networks, maintenance and installations services are also subject to licensing. There are two types of licenses in telecommunications sector: standard and individual licenses. The Ministry of Communications takes a decision to issue a license within one month. Each license is for a fixed term of three years.

The existing licensing regime is based on individual licenses for all types of telecommunications activities and should be changed and harmonized with the ICT trends and new technologies and services.

The fixed term of license which is three years is very short for types of activities such as services providing of local, long-distance and international fixed- telephony services, wireless telephony services, cellular mobile services, data transmission services, and do not permit to recover the investment.

Uzbekistan

Licensing in the telecommunications sector is the responsibility of the Ministry for Development of Information Technologies and Communications in accordance with the Regulation on Licensing Activities in the Telecommunications. The activities in telecommunication sector subject to licensing are networks design, installation, operation and provision of telecommunication services which include local, long- distance, international fixed-telephony services, mobile cellular services, paging, data transmission services (Internet), distribution radio and TV programs (broadcasting).

There are two types of licenses: standard and individual. Standard are licenses issued to legal entities to carry out activities in the telecommunications on the basis of common requirements and conditions, and individual - the licenses issued to legal entities to carry out activities on the basis of the specific requirements and conditions. The licenses are issued for a period from 5 to 15 years. The licenses for data transmission services (Internet) are issued for 5 years.

- *Regulating limited resources: radio frequencies regulation (spectrum road map, spectrum sharing/ trading, license renewal, spectrum re-farming) and numbering resources, number portability, selection and pre-selection of the operator*

Spectrum is one of the critical issues in view of the growing demand for connectivity. Many countries are reconsidering their fundamental spectrum policies by finding alternatives to traditional approaches.

Frequency management includes two main tasks: (i) frequency allocation, including the approval of the national frequency plan that specifies which frequency bands can be used for specific services; and (ii) frequency assignments, covering individual authorizations to use spectrum. Frequencies for the military sector are normally decided apart from civil assignments.

More flexibility is necessary in spectrum management, such as spectrum sharing, spectrum re-farming, spectrum trading or other transactions between operators and the introduction of flexible criteria for spectrum use in order to be able to accommodate market changes quickly. The issue of spectrum allocation should also be addressed to ensure that the increasing demand for high-speed mobile access can be met, including in rural areas, where the additional spectrum represented by the digital dividend could play a crucial role in universalizing mobile-broadband access.

Effective administration of the numbering recourses, the selection and pre-selection of the service providers and telephone number portability will support and stimulate competition in the market.

The following Table 18 provides an overview of the transition from analogue to digital broadcasting, digital dividend, some important elements of administration and regulation of radio frequency spectrum and number portability status in six of the ECO Member States.

Table 18. Status of six ECO Member States

	AF	AZ	IR	KY	PA	TU
Radio frequencies conversion				not finished		not finished
The transition from analogue to digital broadcasting	on-going	ready for switch	on-going	on-going	no	on-going
The reallocation of spectrum for digital dividend, expected digital dividend	under process 710 – 742 MHz	Yes, 698-798 MHz are allocated, 791-862 MHz are not allocated yet	no 790 – 862 MHz and 694 – 790 MHz	Yes 790-862 MHz 694-790 MHz: After WRC-15	no no	Yes 2016 790-862 MHz
Re- farming	2013, 900 MHz		2.3GHz (2.3 – 2.4), and 2.6GHz (2500 – 2670Mz)	on-going 900, 1800, 2100 MHz	1800 MHz	2008 and 2016 completed 900 MHz
The spectrum rights trading	not allowed	not allowed	not allowed		not allowed	yes
Number Portability	no	Yes, 2014	no MNP May 2016	no MNP 2018	yes March 2007	Yes 2008-MNP 2009-FNP

The radio frequencies conversion is not completed yet in Kyrgyzstan and Turkey. The transition from analogue to digital broadcasting is ready for switch in Azerbaijan and is on-going in Afghanistan, Iran, Kyrgyzstan and Turkey. Kyrgyzstan and Turkey reallocated the spectrum for digital dividend. The spectrum rights trading and fixed number portability is implemented only in Turkey. Pakistan and Turkey launched the mobile number portability in 2007 and 2008 respectively. Iran and Kyrgyzstan are going to implement it in a few years.

Afghanistan

The radio frequency spectrum is declared by the Telecommunications Services Regulation Law as a limited natural resource and is not permitted to utilize licensed radio frequencies without obtaining a Spectrum License from the Spectrum Management Department of the Ministry of Communications and Information Technology. The unlicensed spectrum approved for usage is the ISM band in the 2.4 GHz and 5 GHz ranges and other bands which could be considered by ATRA. Licensed network operators and Internet Service Providers (ISPs) utilizing unlicensed spectrum are required to register at MCIT. Beside the Telecommunications Services Regulation Law, the Regulation for the Use of Radio Frequencies and

Radio Communications Equipment in Afghanistan is the most important document, which regulates aspects relating to the use of radio frequencies, including fees for their use, and radio communications equipment. MCIT' Spectrum Management Department has the duty to publish the Spectrum Allocation Table, has the right to manage the bands designed for civilian use from the Table and takes the decision to assign radio frequencies/canals. The Spectrum Allocation Table is in line with the ITU World Radiocommunication Conferences 2003 (WRC-03). The radio frequencies from the 900 MHz, 1800MHz and 3400MHz bands are assigned via tender. The re-farming/in-band migration is allowed in Afghanistan. In 2013 the re-farming of 900 MHz band was completed, which allowed the deployment of the five GSM mobile operators. The transition from analogue to digital broadcasting is on-going. The reallocation of spectrum for digital dividend is under process and it is expected to be 710 – 742 MHz frequency range.

In Afghanistan the spectrum rights trading are not allowed. The ATRA examines the possibility of introducing of the Mobile Number Portability (MNP).

ATRA prepares, publishes and manages the National Numbering Plan. The assignment of numbers is made by the ATRA for an indefinite period of time and ATRA can revoke the assigned numbers. Assigned numbers can be transferable to other providers with approval of the ATRA.

Azerbaijan

Management and regulation of radio frequency spectrum is dispersed across several different government institutions. In order to manage radio spectrum in the country, the State Commission for Radio Frequencies (SCFR) was established under the Cabinet of Ministers in accordance with the decree of the President of Azerbaijan dated August15, 1996. The Commission is a collegial body under the Cabinet of Ministers, including representatives of the relevant Ministries and is headed by Azerbaijan's Deputy Prime Minister. Since 2007 the State Commission on Radio Frequency (SCFR) approves the Table of the allocation of frequency bands between the radio services of the Republic of Azerbaijan (published on the MCHT web site). Radio frequencies are allocated according to paragraph 1.3 of the Decision No 22 of the Cabinet of Ministers dated February 1, 2007 on approval of the "Rules on allocation, registration, use of radio frequencies and determining payment". SCFR assigns frequencies to operators. The Ministry registers assignments of frequency, collects frequency fees, monitors frequency usage and checks radio-frequency equipment. The National Council on Television and Radio Broadcasting allocates frequencies for broadcast services. Spectrum is not assigned on a competitive basis.

All three mobile operators have a mutual agreement on national roaming.

According to the Table of the Allocation of Frequency Bands Between the Radio Services of the Republic of Azerbaijan, radio frequency bands are divided in two groups: private usage (bands, are intended only for state usage) and general usage (bands, are intended for civil and state usage). The frequency bands for "general usage" are assigned according to the decision of SCFR. The involvement of the Ministry of Defense in the decisions of the SCRF could delay the assignment of radio spectrum for civil usage and impact the availability of spectrum for new entrants and new technologies.

The Telecommunications Law recognizes numbering as a national resource and authorizes MCHT to develop and approve the National Numbering System and Plan, issue rules for allocation and use of numbering resources. MCHT may not discriminate in assigning numbers. The State Tariff Council sets fees for numbering. The numbering rules state that new numbers must be assigned within 30 days from the date of request. The current practice is between 15 to 30 days.

There is no carrier selection, but there is carrier pre-selection.

Iran

The duties of the CRA regarding radio frequencies are the elaboration of the regulations and approval of the national radio frequency table, establishment of criteria and parameters for optimum utilization of frequency spectrum, frequency spectrum management and monitoring.

 CRA issues the licenses for establishment and operation of radio networks (Land Mobile, Maritime, Aeronautical, Fixed and Space Services) and for radiocommunication services in accordance with the National Table of Frequency Allocation. The decision to assign radio frequencies/canals is taken by CRA and radio frequencies/canals are assigned by individual license, class license, spectrum license and permits that allow their use. The validity period for assigned radio frequencies/canals is from 1 year up to 5 years for Radio Licenses and up to 15 years for access segment of telecommunications operators, which can be also renewed for similar periods. The Communications Regulatory Commission has the power to establish the spectrum pricing regulation.

The radio frequencies which are demanded by cellular mobile operators, fixed wireless access (FWA) operators, and similar operations are assigned via tender. The re-farming/ in-band migration is allowed in Iran: the re-farming of 2.3GHz (2.3 – 2.4), and 2.6GHz (2500 – 2670MHz) bands were completed, which allowed deployment of the 2 mobile operators (3G, 4G) and 5 fixed wireless access (FWA) operators (LTE-TDO).

The transition from analogue to digital broadcasting is currently under implementation.

The spectrum for digital dividend has not yet been reallocated. The frequency ranges expected to be assigned as digital dividend are 790 – 862 MHz and 694 – 790 MHz and may be reallocated for mobile operations.

The spectrum rights trading is not allowed yet in Iran. It is considered to be possibly implemented in 2 years.

CRA has the right to develop and manage the National Numbering Plan, and assign numbering resources. Iran National Numbering Plan is a open numbering plan, it is developed based on the Recommendation E.164 and it is approved by CRA. CRA takes the decision to assign a numbering resource. However, the procedure of managing the numbering resources is not established. Numbering resources, except services code, have no validity period, but in special situation CRA has the right to renew them. The numbering resources are assigned for a fee and the tariff is set by Communication Regulatory Commission.

The Regulation on Number Portability was adopted in June 2015 and the number portability for mobile numbers is going to be implemented by May 2016. It is expected that it will be take 6 days to port the number for post paid and 3 days for prepaid.

Pakistan

Pakistan is situated in Region 3 and Pakistan' Table of Frequency Allocations has been prepared in accordance with the ITU Radio Regulations, Article 5.The Pakistan Telecommunication Authority (PTA)

is responsible for radio frequencies administration and management, receiving the applications for the use of radio frequency spectrum and transferring them to the Frequency Allocation Board.

The Frequency Allocation Board was established under Pakistan Telecommunication (Re-organization) Act 1996 and has the exclusive authority to allocate and assign bands of the radio frequency spectrum to the Government, providers of telecommunication services and telecommunication systems, radio and television broadcasting operators, public and private wireless operators and others. The Frequency Allocation Board consists of representatives from different interested authorities and Ministries, including the Ministry of Defense and Ministry of Interior. The Board issues regulations, with the approval of the Federal Government. The Frequency Allocation Board creates, formulates and reviews the National Frequency Spectrum Plan, specialized Frequency Band Plans, proposes the optimization of spectrum utilization in the country and coordinates assignment of frequencies with other administrations. It performs spectrum assignment tasks for government, semi-government and private users of radio frequency in Pakistan. The Frequency Allocation Board compiles and keeps up to date the database of all assigned radio frequencies and carries out the spectrum monitoring .

The application for allocation and assignment of radio frequency spectrum in telecommunications is submitted to the Pakistan Telecommunication Authority (PTA) which transfers the application to the Board within 30 days from receipt. The Frequency Allocation Board recommends the available frequency bands for this specific use. For telecommunications sector the Ministry of Information Technology issues Policy Directives to PTA, which after auction (in the majority of the cases) issues licenses to the successful bidders. It is important to mention that frequencies are auctioned mainly for the telecommunications services. The validity period for assigned radio frequencies/canals is 15 years for mobile services and it can be renewed upon request of the licensee.

Other sectors such as civil aviation or maritime have their own mechanism for frequency allocation.

The spectrum rights trading is not allowed yet by the law. There is a provision on spectrum trading in the Telecommunications Policy 2015.

The re-farming/ in-band migration is allowed for 1800MHz, 1900MHz and 2100 MHz bands. One Mobile operator has completed in-band migration by deploying LTE technologies in their 1800MHz band (previously used for GSM services).

The transition from analogue to digital broadcasting is not yet implemented and it has not been decided which frequency ranges will be used as digital dividend.

In the Pakistan' Table of Frequency Allocations the categories of use of radio frequencies, such as the governmental use, non-governmental use and shared use are not established. In this case all the civil or Governmental applicants pass a longer procedure.

The PTA has the right to develop, to manage the National Numbering Plan, and assign numbering resources. Pakistan National Numbering Plan is a closed numbering plan, it is developed based on the Recommendation E.164 and approved by PTA. PTA takes the decision to assign a numbering resource, according to the established and published Numbering Allocation and Administration Regulations. Numbering resources have no validity period. PTA may cancel or withdraw allocated numbers on request or in case of default. The numbering resources are assigned for a fee and the tariff is set by PTA.

The number portability for mobile numbers was implemented on 23rd of March 2007 and the Regulation on Number Portability was adopted. It takes 4 days to port the number and the number portability subscriber does not have to pay. The recipient operator pays to the donor operator and inter operator charges of Rs 250/-. Approximately 33 million numbers were ported.

Turkey

ICTA is responsible for frequency allocation in Turkey, including the approval of the National Frequency Plan that specifies which frequency bands can be used for specific services and for frequency assignment, covering individual authorizations to use spectrum for electronic communications, while frequency assignment for broadcasting is carried out by the broadcasting authority. ICTA is managing and monitoring of the radio spectrum, allocating satellite position and numbering recourses. The National Frequency Plan is in line with the ITU World Radiocommunication Conferences decisions. There are some bands of frequencies that are designed for civilian use according to the ITU World Radiocommunication Conferences, but still being used for military purposes and a coordination procedure is maintained with military. The radio spectrum policy program (spectrum road map) that ensures the strategic planning and harmonization of the use of radio spectrum is currently under preparation and there is no defined implementation period yet.

ICTA takes the decision to assign radio frequencies/canals and radio frequencies/canals are assigned by radio licenses and authorizations that allow their use. The validity period for assigned radio frequencies/canals can be up to 25 years and it can be renewed for similar timeframes. The validity period for issued GSM radio licenses is until 2023 and for IMT and UMTS - until 2029. After August of 2015 all granted frequency bands are changed to technology neutral.

The radio frequencies from 880-915 MHz/925-960 MHz, 1920-1980 MHz/2110-2170 MHz, 791 – 821 MHz/832 – 862 MHz, 1710,1 – 1784,9 MHz /1805,1 – 1879,9 MHz, 2010-2025 MHz (TDD), 2500–2550 MHz/2620–2670 MHz and 2570– 2605 MHz (TDD) bands have been assigned to mobile operators.

The Electronic Communications Law provides the spectrum rights trading. According to the Law ICTA may give permission to the operators for spectrum trading under certain conditions, however there was no such case yet.

The re-farming/ in-band migration is allowed: the re-farming of 900 MHz band, completed in 2008, enables consecutive use of spectrum by mobile operators. The re-farming in 900 MHz band has been realized in 2016 to make consecutive use of spectrum by the mobile operators by taking into account the results of the auction held in August, 2015The transition from analogue to digital broadcasting has not been implemented yet. The spectrum for digital dividend has been reallocated and operators will start to use 790-862 MHz band in April 2016.

ICTA has the right to develop, to manage the National Numbering Plan, and takes the decision to assign numbering resources. The National Numbering Plan is open and is developed based on the related ITU recommendations. NNP is determined by ICTA via Ordinance on Numbering which includes the procedure of managing the numbering resources published in the Official Gazette.

The validity period for assigning the numbering resources is 1 year and can be renewed. The numbering resources are assigned for a fee. Minimum values of the fees for rights of use of the numbering resources are determined by the Board of Ministers upon the ICTA's proposal and the resolution of the Ministry of

Transport, Maritime Affairs and Communications. Fees of right of use are determined by ICTA taking into account the minimum values determined by the Board of Ministers. Mobile number portability was implemented on November 9, 2008 and fixed number portability (geographic and non geographic numbers) was implemented on September 10, 2009. It takes maximum 6 days to port a number. According to the related legislation, is possible to recover administrative cost from the recipient operator through one time charge. This is determined by ICTA and is approx. € 0.66. Also, the recipient operator may demand a fee from the subscriber porting the number to its network. However that fee should not impede the subscriber to benefit from the number portability.

As of end of August 2015, 85.601.387 mobile numbers and 906.165 fixed numbers were ported.

Kazakhstan

According to the Law on Communications No. 567, the Government is responsible for the development and implementation of the state policy on allocation of radio frequency spectrum and effective use of radio frequencies, as well as approval of the Statute and Membership of Interagency Commission of Radio Frequencies, approval of the Radio Frequency Allocation Table, approval of rules of conversion of radio frequency spectrum and approval of procedures and fees for the assignment of frequencies. The Communication, Informatization and Information Committee of the Ministry for Investment and Development is responsible for the implementation of the state spectrum policy, international coordination and compliance, exercises spectrum planning, assigns radio frequencies/channels for civil use, issues authorizations to use radio frequencies and maintains the register of authorizations. The Committee has the duty to monitor the usage of the radiofrequency spectrum. The Law on Communications sets out principles for transparent and open procedures for allocation and granting of spectrum rights. The Law does not state a specific term for allocation and use of radio frequency spectrum. However decisions on rights of use for spectrum should be taken within two months. Spectrum trading is currently prohibited by the Law.

In the Radio Frequency Allocation Table almost all radio frequency bands have a shared use category. This means that a large part of the frequency spectrum remains controlled by the military and an approval is required from the military institution for civilian purposes.

The Committee is responsible for allocation, assignment and withdrawal of numbering resources. Procedures for allocation of numbering resources and assignment of numbers are provided by the Rules of Numbering Resources Allocation, Assignment and Withdrawal approved by a 2011 Government Decree. The Committee decisions on allocation or withdrawal of numbering resources must be taken within 30 working days from receipt of application. The Numbering Plan and information on scarcity of numbers are made public.

Kyrgyzstan

Article 9 of the Law on Telecommunications and Postal Communication defines the radio frequency spectrum as a property of the state. However, it is not defined as a limited resource and the principles of its distribution and administration are not established. The National Frequency Assignment Table of the Kyrgyz Republic (NFAT) is approved by the Decree of the State Commission for Radio Frequencies of the Kyrgyz Republic (SCRF) of June 2, 1998. Changes in the Table were made in order to bring it in the line with the WRC-12. Currently it is being coordinated with ministries, including internal affairs and defense.

The State Commission for Radio Frequencies of the Kyrgyz Republic is a permanent acting interdepartmental body that has the functions of adopting NFAT for civilian needs, defense and state security, developing and implementing the state policy on the distribution and use of radio frequency bands and the positions of the geostationary orbits, providing strategic recommendations in respect to the use of radio frequencies and conversion (release) of radio frequency range in the Kyrgyz Republic.

The State Agency for Communications (SAC) allocates the radio spectrum for different categories of users and services on the basis of recommendations of the SCRF. SAC takes the decisions on radio frequencies assignment and radio frequencies/canals are assigned by licenses or authorizations. The validity period for assigned radio frequencies/canals can be up to 10 years and it can be renewed for similar timeframe. Spectrum allocation currently operates on a "first come, first served" basis and requests for radio frequency spectrum may be refused on the grounds of scarce resources. No tender procedure for radio frequencies/canals is foreseen. Additionally SAC informs that the first pilot project for the auction of radio frequencies in the 790-862 MHz range was implemented in 2015.

There are bands or frequencies that are designed for civilian use according to the ITU World Radiocommunication Conferences, but de facto are used for military purposes. To solve these problems a working group was set up.

No categories of use of radio frequencies, such as the governmental use, non-governmental use and shared use are established in the NFAT. In this respect, at the assignment of radio frequencies is considered that all radio frequency bands are in the shared use category and their assignment requires the opinion and approval of the State Commission for Radio Frequencies of the Kyrgyz Republic (SCRF). This process complicates and lengthens the allocation and assignment of radio frequencies.

The Law on Telecommunications and Postal Communication does not envisage technology neutrality and mobile licenses are issued for different technologies and standards.

The spectrum rights trading is not envisaged by legislation. Currently, works are ongoing on the re-farming in the bands 900, 1800 and 2100 MHz at a joint use of standards LTE, UMTS and GSM.

The transition from analogue to digital broadcasting has not been completed yet, the social package of TV programs in digital format covers 86% of the country population,

The first digital dividend in 790-862 MHz band was re-allocated to cellular mobile services. The re-allocation of the second digital dividend in 694-790 MHz band will be possible on the results of WRC-15.

SAC has the right to develop, manage the National Numbering Plan, and assign numbering resources. A draft of the National Numbering System and Plan of Telecommunication Networks has been developed, taking into account the recommendations of the ITU, and will be approved by the Government of the Kyrgyz Republic. The numbering resources management procedure is set out in the draft of the National Numbering System and Plan. Currently the numbering resources are issued free of charge, but in the near future the Government will decided on the issue of introducing payment for the numbering resources.

The number portability is planned to be implemented at the beginning of 2018. It is expected to implement number portability in the mobile networks. The Regulations on number portability is currently under development.

Turkmenistan

Radio Frequency Spectrum is regulated by the Law on Electronic Communications and the Law on Radio Spectrum, which addresses the conditions and principles of spectrum use, limitation and termination of the right to use spectrum and state supervision. The National Radio Frequency Spectrum Table is approved by the Cabinet of Ministers. The Interdepartmental Commission for Radio Frequencies under the Cabinet of Ministers establishes the procedure for the use of radio frequency spectrum and deals with all sectors, including communications, broadcasting and military uses. The assignment of radio frequency bands for all sectors is carried out by the Interdepartmental Commission for Radio Frequencies and the Ministry of Communication manages the spectrum in the communications sector. Radio monitoring is carried out by the supervisory body on the use of radio frequency spectrum under the Ministry of Communication.

The Law on Communications provides a definition and regulatory framework for numbering resources. The Ministry of Communications defines the procedure for allocation and use of numbering resource in coordination with the Cabinet of Ministers. The Ministry has the right, in cases established by Law, to modify, and withdraw fully or partially numbering resource, with prior written notification within 30 calendar days before the date of withdrawal.

Operators have the right to transfer allocated numbering resources to other operators only with the consent of the Ministry. Numbering fees are set by the Cabinet of Ministers. The national numbering system is developed by the Ministry, however it is not indicated which authority approves the national numbering plan. There is no provision for number portability.

Uzbekistan

The legal framework for radio spectrum in Uzbekistan are the Law on Telecommunications and the Law on Radio Frequency Spectrum. Frequency allocations are carried out by the Republican Council for Radio Frequencies, in some cases by competitive tendering. The functions of Republican Council for Radio Frequencies include the implementation of state policy in ensuring the efficient use of radio frequency resource, development and implementation of the concept of allocation and use of radio spectrum, the development of the national radio frequency Table, the organization of the radio monitoring. Frequency allocations are carried out by the Republican Council for Radio Frequencies, in some cases by competitive tendering. There are nearly no frequency bands for civilian use in the Radio Frequency Table of the Republic of Uzbekistan, mainly those are for shared use. The Department of Regulation of Radio Spectrum was set up within the Ministry of Development of Information Technologies and Communications for organizational and technical support to the Republican Council for Radio Frequencies.

The Ministry of Development of Information Technologies and Communications develops, approves the numbering system and numbering plan, assigns numbering resources and carries out the management of the numbering plan. The Ministry performs the control over the use of numbering resources. The numbering resources are assigned on a paid basis, the fees and payment procedure are determined by law.

- *Regulating access to the networks and services, interconnection, access to the last mile and physical infrastructure, passive and active network sharing*

Afghanistan

ATRA is the authority, which is setting rules regarding interconnection and publishes a standard Interconnection Agreement to be used by all licensed operators as a framework for interconnection. The Telecommunications Services Regulation Law imposes general obligations concerning interconnection for all operators. All services providers of public services have the right and obligation to negotiate interconnection arrangements among themselves. ATRA has the right to intervene in commercial disputes between operators and prescribe fair and non-discriminatory terms and conditions for interconnection of the different networks and services. Stronger obligations on interconnection are imposed to an operator that has Significant Market Power (SMP). Under the Telecommunications Services Regulation Law, an operator that has a market share of 40% or more is deemed to have SMP. All operators with SMP must provide interconnection where is requested, apply equivalent conditions in equivalent circumstances to affiliate and non-affiliated competitors, including price, time period and quality. Interconnection rates have to be cost-based and non-discriminatory. The Reference Interconnection Offer (RIO) of the operators with SMP is approved by ATRA and ATRA can modify it. The Law determines which technical and commercial information shall contain RIO.

The Open Access Policy (2012) ensures access to shared and scarce resources through the principles of non-discrimination, transparency and cost-based pricing. The Policy especially refers to the access to the National Optical Fiber Cable owned by Afghan Telecom, the incumbent. ATRA defines service quality guidelines and proposes a tariff plan for Afghan Telecom. ATRA conducts market analyses periodically to ensure that no abuse of SMP has occurred with respect to shared infrastructure.

Azerbaijan

Operators must provide interconnection and sign interconnection agreements. MCHT, together with operators, determined the interconnection conditions that were then transposed into interconnection agreements signed by all operators. Operators may request that MCHT settles interconnection and access disputes. If negotiations fail, or one of the parties does not agree with the decision, it may appeal to courts. All appeals of MCHT decisions are to be made to the Economic or Administrative Courts, however to date there are no such appeals. MCHT is included as a third party to court hearings involving operators.

There are no published interconnection offers, although MCHT does regulate call termination. The call termination rate is defined as €0.05 per minute for both fixed and mobile networks. However, asymmetric rates have been applied for Azerfon, the third mobile operator as a new entrant to the market. Thus, only mobile operators Azercell and Bakcell pay €0.02 per minute for call termination in Azerfon's network.

Iran

The Communications Regulatory Agency (CRA) is responsible for ensuring the interconnection in the ICT sector. It has the duty of drafting and proposing directives and criteria for interconnection among computer and telecommunications networks from security and connection safety point of view and also their tariff to the Commission and supervising over their correct application.

The operator's licenses are the regulatory documents to ensure interconnection and interoperability of the networks and services. The new-entrants operators have the right to negotiate the interconnection with the owner of the existing network and all operators have the obligation to offer for new-entrants operators interconnection and access to the associated infrastructure. The interconnection cannot be denied and the dispute settlement mechanism is established. No operator has the obligation to prepare and publish the

Reference Interconnection Offer (RIO). Currently this issue is being reviewed. CRA approves the interconnection charges and the cost-based method of payment is used between operators. The interconnection rates for termination of international traffic is 335 IRR for mobile, 85 IRR for fixed; Fixed –to- Fixed: 80%-20%; Mobile –to- Fixed : 83.5/167 IRR; Fixed –to- Mobile : 334 IRR and Mobile – to-Mobile: 334 IRR.

The main difficulties related to interconnection is the signature of the Interconnection Agreement, especially for the interconnection rates.

The shared access to the local loop or local sub-loop: access to non-voice band frequency spectrum of a local loop is implemented. The Telecommunications Company of I.R. of Iran is the owner of the local loop infrastructure and has the obligation to offer access to the local loop. In August 2016 the RUO of The Telecommunications Company of I.R. of Iran will be sent to the CRA. The draft RUO includes some of the conditions of access to the associated physical infrastructure.

In 2008 the leased lines segment of the market was partially liberalized. All operators /providers are required to provide passive/physical infrastructure sharing. The fees for the use of associated physical infrastructure are under examination.

Kazakhstan

According to the Article 25 of the Law on Communications all operators of the public telecommunications networks are required to provide interconnection in accordance with the rules approved by the Government of the Republic of Kazakhstan. According to the rules on interconnection of telecommunication networks, all operators of telecommunications have the right of interconnection to public switched telecommunication networks.

In terms of the dominant network operators, interconnection is regulated by a standard interconnection agreement coordinated with the Communication, Informatization and Information Committee of the Ministry for Investment and Development of the Republic of Kazakhstan. For the dominant operators of public telecommunications networks the Interconnection Agreement, which determines the conditions of interconnection providing to other telecommunications networks, as well as the related obligations of the networks interconnection, is approved by the Communication, Informatization and Information Committee of the Ministry.

In 2015 the interconnection rates from/to mobile networks are symmetric and amount to KZT 8 per minute. The mobile operators have also agreed on the further reduction of the rate in 2016 to KZT 5 per minute.

Earlier in 2015, interconnection rates to mobile networks decreased from KZT 8.88 to 8 per 1 minute of talk until the end of 2015. Starting with January 2016 a new rate will be applied of KZT 5 per 1 minute. As a result the prices for voice services may decrease in Kazakhstan,

Kyrgyz Republic

The Law on Telecommunications and Postal Communication is the legal act that ensures interconnection and interoperability of the networks and services. The draft of the Rules of Interconnection is being developed. The State Agency for Communications (SAC) is responsible for ensuring the interconnection

in the ICT sector and regulates the conditions for the joint use of public telecommunications network by operators and providers of telecommunications services.

All operators have the obligation to offer interconnection and access to the associated infrastructure to the new-entrants operators. After being granted a license, the new-entrant operator sends a written interconnection proposal to any operator. The interconnection cannot be refused, if there are technical possibilities for its implementation. Any refusal in the interconnection must be fully justified. Operators with dominant position in the market have the obligation to prepare the Reference Interconnection Offer (RIO) which is approved by the State competition authority.

According to the Law, 3 months is the term for the negotiating and signing the Interconnection Agreement. Interconnection agreements are made between operators. SAC establishes general conditions, including the pricing principles to be met by the Interconnection Agreement and has the exclusive right to establish a procedure for the settlement of the arbitration or dispute resolution. In case of the negotiation fails and whenever there are disputes, SAC takes the decision on the matter within 6 months.

Pakistan

The Section 5(2) (h) of Pakistan Telecommunication Reorganization Act 1996 is the legal act and the Interconnection Rules 2000, Interconnection Guidelines 2004, Interconnection Dispute Resolution Regulation 2004 is the regulatory framework to ensure interconnection and interoperability of the networks and services. Pakistan Telecommunication Authority (PTA) is responsible for ensuring the interconnection in the ICT sector and provides guidelines for, and determines, the terms of interconnection arrangements between licensees, where the parties are unable to agree upon such terms.

Each operator on the request of another operator shall negotiate an agreement to interconnect the other operator's telecommunication network to its own and shall enter into an interconnection agreement with another operator within 90 (ninety) days.

Only Significant Market Power Operator (SMP), including Pakistan Telecommunication Company Limited (PTCL) and Pakistan Mobile Communication Company Limited (PMCL) have the obligation to prepare and publish the Reference Interconnection Offer, which is approved by PTA. A dispute settlement mechanism on the Interconnection Agreement negotiations is established in the Dispute Resolution Regulation 2004.

PTA approves the interconnection charges and Termination Rates based on the Long Run Incremental Cost (LRIC). Interconnection charges for termination of international traffic are PKR 0.90 Mobile and PKR 0.65 Fixed Domestic Termination Rates, Fixed to Fixed PKR 0.65; Fixed to Mobile PKR0.65; Fixed to Mobile PKR 0.90; Mobile to Mobile PKR 0.90.Transit Metro Rs. 0.12 25-80 km PKR 0.30 & above 80 km + PKR 0.55.

The main difficulties related to interconnection are that more legal provisions could be inserted in the Act to improve interconnection and access to associated facilities.

Shared access to the local loop or local sub-loop: access to non-voice band frequency spectrum of a local loop is implemented. SMP operators have the obligation to offer access to the local loop and publish the Reference Offer for the Access to the Local Loop (RUO.) The leased lines segment of the market was liberalized in 2003. The operators with SMP are obliged to provide the leased lines to other operators.

Passive/physical infrastructure sharing is not mandatory, but it is encouraged by PTA.

Tajikistan

In accordance with Article 29 of the Law on Telecommunications, the dominant network operators have to meet requests for interconnection of their networks with the networks of other licensed telecommunications operators. Interconnections are made on the basis of bilateral agreements between the operators and are approved by the Communication Service. The Interconnection Agreements are signed on basis of the principle "everyone with everyone". The Reference Interconnection Offer was introduced that serves as the basis for the conclusion of the Interconnection Agreements. The procedure for concluding Interconnection Agreements, and other conditions and procedures pertaining to interconnection are established in the Regulation No. 9 of 01.06.2004 on Access to Telecommunications Networks and Interconnection in the Republic of Tajikistan approved by the Ministry of Communications of Tajikistan.

The interconnection cannot be denied, if there are technical possibilities for its implementation. Any denial of interconnection must be fully justified. In the case of refusal to interconnect, the aggrieved party may complain to the Communication Service. The Communication Service diagnoses the telecommunications networks in order to identify opportunities to connect and takes the decision.

Interconnection rates are set by the Antimonopoly Service.

The access to the last mile in the Republic of Tajikistan is made on the basis of the Interconnection Agreement, which contains in the annex a special agreement concerning the conditions of access to the last mile and associated physical infrastructure. Until now the dominant operator in the relevant market was not bound to publish the Reference Offer for the access to the local loop and access to associated facilities (RUO), and this Reference Offer does not exist.

Turkey

According to Access and Interconnection By-Law, ICTA is responsible for the regulation of access and interconnection issues and has the duty to set out the procedures and principles regarding access to and interconnection of electronic communications networks.

All operators are obliged to negotiate on interconnection with each other upon request. In case that the parties cannot reach an agreement, ICTA may impose on operators the obligation to provide interconnection. ICTA does not intervene during the negotiation process of the Interconnection Agreement, but in case no agreement is established within maximum two months following a new access request, any one of the parties may apply to ICTA for the dispute settlement procedure to be initiated.

ICTA may impose on operators with SMP in the relevant market the obligation to prepare Reference Access Offers, including interconnection. Mobile Reference interconnection Offers have been published since 2005. However, Reference Interconnection Offers of fixed incumbent Türk Telekom have been published since 2004. ICTA may request the operators to amend their Reference Access Offers. In the case when operators do not make the amendments requested by ICTA within a particular timeframe, ICTA shall be entitled to make such amendments on its own initiative.

ICTA may impose on operators with SMP in the relevant market obligation to set their access tariffs on cost basis. ICTA may set the tariffs and/or to introduce upper limit which becomes mandatory to comply with the respective tariffs.

Termination rates of the three mobile operators have been determined by ICTA by the Board decision of June 16, 2013: for Turkcell - 2,50 Kr/min; Vodafone - 2,58 Kr/min; and Avea - 2,96 Kr/min. By the Board decision No. 2011/DK-07/501, dated 27.09.2011, the mobile termination rates for the calls originated abroad and terminated within Turkey have been excluded from price control regulation. Therefore, currently mobile network operators in Turkey can set their commercial termination rates for calls originated outside Turkey.

In Turkey all type of access to the local loop is required and implemented, including shared access, full unbundled access and bit stream (or wholesale) access.

Türk Telekom is the operator obliged to offer access to the local loop and its Reference Offer for the Access to the Local Loop (RUO) was first published in 2007 and the last one was published in 2010. 128 shared access local loops and 3532 full access local loops were offered.

The conditions of access to the associated physical infrastructure are included in another Reference Offer defining the duct sharing implementation procedures.

The incumbent operator Türk Telekom is obliged to provide country-wide access to the leased lines at all speed levels and at legacy leased, Ethernet based, P2P and SDSL technologies. It has also the obligation to non-discriminate. Türk Telekom is the largest supplier and its leased lines market share is intercity 81% and intra-city 67% in the retail level.

All operators /providers are required to provide passive/physical infrastructure sharing.

There is a reference offer of Türk Telekom called Türk Telekom Reference Facility Sharing and Dark Fiber Offer for duct sharing, while for co-location services is the Türk Telekom Reference Co-location Offer. The prices for the use of associated physical infrastructure are determined as cost based. The co-location fees are determined by an expert company outsourced by ICTA. Duct sharing prices are determined on the basis of incumbent operator's cost model.

There are about 130 exchanges in which the co-locations were offered and roughly 77 km of physical infrastructures were shared.

There have not been registered any difficulties for the new-entrants in gaining access to passive/physical infrastructure in Turkey.

Turkmenistan

Interconnection provisions are regulated by Article 15 of the Law on Communications. The procedure and conditions of telecommunications networks interconnection, the provision of mutual services among operators and settlements between them is approved by the Ministry of Communications. The Law obliges the operators to provide access to their networks for other operators based on agreement or other legal provisions, if technically feasible. Technical conditions must comply with interconnection rules approved by the Ministry. If interconnection is not available as required, in these cases the

interconnecting operator must pay the cost of creating the interconnection link. Any disputes between the operators are adjudicated by the court in Turkmenistan.

The infrastructure sharing is not regulated.

Uzbekistan

The interconnection in Uzbekistan is regulated by Article 17 of the Law on Telecommunications, the Regulation No. 377 of 12.12.1997 on Interconnections of Telecommunication Networks to the Public Telecommunication Networks and several other regulations and methodologies. The rules and conditions of networks interconnection, provided interconnections services and mutual settlements between operators are approved by the Ministry of Development of Information Technologies and Communications. The Law establishes that operators and service providers are required to provide access to their networks to other operators and service providers on equal conditions. Operators must provide interconnection according to technical conditions issued by the acquiring network operator and the interconnection is implemented on the basis of agreements between operators.

The disputes among the operators are settled in accordance with the legislation of the Republic of Uzbekistan and the Ministry of Development of Information Technologies and Communications that has the duty to examine the relationship between operators.

- *Tariff policy regulation*

The level of regulated prices, together with enforcement procedures, is the most significant element of the obligation imposed by regulators. The price element, among others, has played a key role in opening markets to greater competition and providing the right incentives for investment and innovation. Under certain circumstances, low prices may discourage investment in new networks both by incumbent operators and new entrants.

Afghanistan

ATRA is responsible for tariffs regulation in the sector and regulates tariff for operators with SMP, which includes publishing and filing latest tariffs with ATRA, and obtaining ATRA approval for new services or changes to tariffs. Licensee having significant market power is exempted from the tariffs approval by ATRA, if it has no ability to subsidize the provision of this service or applied tariffs are non-discriminatory.

Azerbaijan

The Law on Telecommunication (2005) establishes that the Ministry sets tariffs for interconnection, based on international benchmarks rather than on the cost models. The Ministry provides recommendations to the State Tariff Council on retail tariffs, taking into account a variety of factors, which then takes the final decision on tariffs. Ministry does not have the authority to impose cost separation or cost accounting and there is no requirement for tariffs to be set based on costs.

Iran

The CRA has the duty to establish the tariff policies in the ICT sector and regulates, monitors and controls the prices and tariffs. The cost based principle is applied in establishing the prices and tariffs. All tariffs and prices that CRC sets up now are price cap. The retail tariff for international bandwidth was rebalanced about a year ago; as a result the retail tariff of international bandwidth decreased. The tariff for fixed telephony service was also rebalanced one year ago. As a result no other unbalanced tariffs remain that can destroy the competition.

Turkey

ICTA determines criteria, procedures and principles regarding tariffs. The principles applied in establishing the prices and tariffs are established in the Electronic Communications Law and are the following:

- tariffs shall be fair, transparent without making unjustified discrimination among users in equivalent conditions;
- tariffs shall reflect the costs of relevant electronic communications services to the possible extent; tariffs shall not be determined in a manner not to cause to hinder, damage or limit competition; tariffs shall promote technological developments and investments which enable the use of new technologies with reasonable prices and consumer interests shall be protected.

Rebalancing of the retail tariff for international, long distance and local calls of the incumbent operator started in 2004 and currently there are no unbalanced tariffs or prices.

ICTA applied the price control mechanisms, such as upper price limit regulation for mobile communication services and price squeeze obligation for fixed telephone incumbent operator.

The additional taxes, prices or obligations imposed on operators that may distort competition and discourage investments are:

- In addition to value added tax (VAT), special communication tax is being applied at the rate of %5-%25 for various services.
- All the operators which are authorized to set up and operate fixed electronic communications infrastructure are obliged to provide facility sharing services. According to the related legislation, facility sharing service has been determined as a prerequisite for operators to demand right of way from the Ministry.

Kazakhstan

According to Article 20 of the Law on Communications, the Communication, Informatization and Information Committee sets tariffs on universal telecommunications services and regulates tariffs for services provided by natural monopoly entities and dominant operators, based on costs including an element of profit. The tariffs of dominant operators in regulated markets are determined according to the "Rules of Pricing in Regulated Markets" as of 2009.

Tariffs for telecommunication services provided by entities not included in the register of natural monopolies or the register of dominant entities are not regulated by the Committee.

Kyrgyzstan

The Law on Telecommunications and Postal Communication provides that SCA, with the agreement of the state anti-monopoly authority, approves the tariffs for communication services. The tariffs are regulated only for operators with monopoly status. The following principles are applied in establishing the tariffs: tariffs and prices should be cost oriented and cross-subsidization should be avoided. Tariffs for international telecommunication services are not regulated by the state. There are not any other unbalanced tariffs and prices that distort the competition. Overall the market itself regulates the tariffs.

Pakistan

Pakistan Telecommunication Authority (PTA) is responsible for prices and tariffs policy in the sector. The principles applied in establishing the prices and tariffs are tariffs based on cost and international benchmarking. PTA and Competition Commission of Pakistan have the regulatory, monitoring and control functions of prices and tariffs. The regulatory documents are the Fixed Line Tariff Regulation 2004, and the recently prepared draft Competition Rules & Draft Telecom Service Retail Tariff Regulation 2015. The rebalancing of retail tariff for international, long distance and local calls of PTCL, incumbent operator, was done in 2002 and no other unbalanced tariffs remain.

On the operators and end-users additional taxes are imposed such as the Federal Excise Duty 18.5%, Withholding Tax 14% and Tax on Broadband Services, SIM activation tax.

Tajikistan

After amendments to the Law on Electrical Communication in 2008, the functions of policy development and tariffs regulation in the telecommunications and information sector, previously carried out by the regulatory authority of communications sector (at the time - Authorized State Body on Supervision and Regulation in the Telecommunications Sector), were transferred to the Ministry of Economy and subsequently to the Antimonopoly Service.

The Communication Service remained with the function of the tariffs monitoring and the right to propose to the Antimonopoly Service to increase or decrease tariffs, as well as to participate in the preparation and coordination of these tariffs.

Turkmenistan

Article 25 of The Law on Communications establishes the principles for tariff setting and determines that calculation of tariffs should be based on the cost of these services, taking into account the profit and time-based payment for services. The law does not state which authority regulates tariffs or whether there is any freedom for operators to set their own tariffs.

Uzbekistan

The Ministry of the Development of Information Technologies and Communications regulates tariffs for telecommunication services, as well as tariffs for interconnection. The regulated tariffs for telecommunication services are determined by the Ministry of Development of Information Technologies and Communications in coordination with the Ministry of Finance. The tariffs for other telecommunications services are established by operators on a contract basis.

The Ministry establishes the tariffs for universal services in coordination with the Ministry of Finance of the Republic of Uzbekistan.

- *Protection of competition (market analyses, SMP regulation, etc)*

The promotion of competition in the provision of telecommunications networks, services and associated facilities and services is another responsibility of the national regulatory authorities.

An important part of regulatory best practice is the implementation of ex-ante (anticipatory) measures to improve market competitiveness for the benefit of consumers and suppliers in the future. This means that the regulator uses modern procedures to define and analyze relevant markets, based on evidence from the market. If this evidence leads to a finding that a particular operator or operators have significant market power, then the regulator should decide and implement proportionate market remedies that could be in the form of legal obligations on operators with significant market power and to ensure that this power is not used anti-competitively.

The need to use ex-ante regulations for a certain period of time is recognized as an essential method to promote competition in the ICT market. This regulatory mechanism is implemented and is still working in all EU countries, being carried out by the regulators of electronic communications sector, which allows maintaining free competition among all operators through preventing cross-subsidies and significant and dominant behavior in the sector. It is also needed to ensure that the procedures and rules of the system of regulation should be transparent, proportionate, fair and non-discriminatory.

Afghanistan

Chapter 7 of the Law establishes legal provisions on activities that constitute the abuse of SMP, including in interconnection, the right of ATRA to determine cases or activities of abuse of dominant position in the market, represented an anti-competitive practice and to take actions to prevent anti-competitive behavior.

The Open Access Policy (2012) provides that ATRA conducts periodically market analyses to ensure that no abuse of SMP has occurred with respect to shared infrastructure. If Afghan Telecom obtains the status of SMP, ATRA will select the regulatory remedies to ensure the competition on the market.

ATRA should have the right to identify relevant markets in the field of ICT sector and analyze the situation in these markets in view of sufficient level of competition. If the Afghan Telecom is a monopolist in fiber optic backbone and fixed telephony infrastructure, surely it has SMP or dominant position in several markets.

Azerbaijan

The State Service for Anti-Monopoly Policy and Consumer Protection within the Ministry of Economic Development is responsible for competition and anti-monopoly issues. The Law on Anti-Monopoly Activities states that an entity with more than 35% of market share is dominant; however, no other criteria or guidance is provided to define whether an entity is dominant. Although the Telecommunications Law authorizes MCHT to "set requirements on the activity of dominating operators", no market analysis provisions are included in either the Law on Anti-Monopoly Activities, neither the Telecommunications Law.

Kazakhstan

The Law on Communications stipulates that the Communication, Informatization and Information Committee conducts analyses of product markets to ensure non-discriminatory access to services and infrastructure and exercises regulation and supervision in the areas of natural monopolies and on regulated markets in the field of telecommunications.

The Communication, Informatization and Information Committee has the right to set tariffs for services provided by natural monopoly entities and dominant operators, based on costs including an element of profit. Tariffs for telecommunication services provided by entities not included in the register of natural monopolies or the register of dominant entities are not regulated by the Committee. The Rules of Pricing in Regulated Markets (2009) establish that tariffs of dominant operators in regulated markets must be justified, based on accounting separation (or cost appraisal if separation is not possible), taking in account the underlying costs, including return on capital employed.

Pakistan

Competition Commission of Pakistan (CCP) is the governmental body dealing with the protection of competition in all sectors. PTA regulates competition in the telecommunication sector, defines relevant markets in the telecommunications sector and analyses them, designates the operators with dominant position and with significant market power (SMP). The Operator that has 25% or more of the market share based on sectorial revenue shall be considered as having significant market power (SMP) on a relevant market. PTA has the right to impose, maintain, modify or withdraw regulatory obligations on the SMP operators such as tariff approval, Reference Interconnect Offer, accounting separation, cost based interconnection charges.

PTCL was declared as operator designated as having significant market power and was imposed such obligations as tariff approval, accounting separation and cost based interconnection and RIO.

Turkmenistan

Although the Law on Communications declares the principle of non-discrimination on the part of telecommunications operators with a dominant position in relation to other operators in telecommunications market, the competition safeguard mechanism is not applied.

There are no provisions in the Law on Communications for ex –ante regulation, such as market analysis, designation of operators with significant market power or imposition of appropriate market remedies on those operators in order to protect competition.

Uzbekistan

The Ministry of Development of Information Technologies and Communications together with the national competition authority promotes competition, prevents unfair competition and restrictions of competition in the telecommunications sector. However, the Law on Telecommunications has no provisions for market analysis, designation of operators with significant market power or imposition ex-ante appropriate market remedies on those operators in order to protect competition.

- *Protection of the end-users interests and Universal Service*

The liberalization of the telecommunications sector and increasing competition and choice for communications services go hand in hand with parallel action to create a harmonized regulatory framework which secures the delivery of universal service.

Afghanistan

The actual Universal Access Policy, as well as the Manual of Operating Procedures for the utilization of the Telecom Development Fund (TDF) was approved in late 2008. According to the Policy, Universal Access is aimed at providing the following minimum facilities: a Public Calling Office (PCO) for every village less than 1,000 population and clusters of more than 100 houses; a Telecenter I (Voice telephony, internet, fax) for every village with 1,000-2,000 population; a Telecenter II (Voice telephony, internet, fax, computer training facility) for every district in rural areas; a mobile phone or mobile Internet kiosk for major nomad groups (100-200 population); at least one telephone line and at least one Internet access line for every rural school; at least one telephone line and at least one Internet access line for every village health clinic.

At that time around 30% of the Afghan population did not have access to telecommunication services within 5km walking distance from their homes. All of these people live in rural areas.

The targets of the Universal Access Program, providing shared access of rural population to telecommunication services within 5km walking distance are: total of 10% and 20% of the uncovered population will be covered through the Universal Access Program by the end of 2012 and 2015 respectively.

The funding source of the Rural Telecommunication Development (RTD) program is the Telecommunications Development Fund. All operators and service providers shall make contributions of 2.5% of the net-revenue to the Fund. In addition for the implementation of its RTD program, financial resources can be attracted from international donors and the government of Afghanistan. Telecom Development Fund (2008) is administered by ATRA and is maintained in a separate account. The aims are to establish connections in isolated regions, particularly in rural and insecure areas. ATRA identifies projects, requests proposals, and assigns the contract/license to the selected operator.

Azerbaijan

According to the Telecommunications Law, the state guarantees the provision of universal service. MCHT adopted a special ministerial regulation on Universal Services implementation, however further guidance is needed to detail the costing, implementation and administration of a Universal Service system. Universal services identified are not the same as those defined by the EU. MCHT advises that only one operator, Aztelecom, operates in the regions requiring universal service. Therefore no other operator participated in the competition organized by the Ministry to select a universal service operator. As a result, Aztelecom was appointed by default.

MCHT established a Universal Service Fund (Universal Service Account) financed from the state budget, numbering fees paid by operators and fees for type approval. At the end of each year the universal service operator provides a loss calculation so that MCHT can reimburse losses associated with providing universal service.

Pakistan

Universal Service Fund (USF) is established and the Federal Government has the power to administer the USF. USF is utilized exclusively for providing access to telecommunication services to people in the un-served, under-served, rural and remote areas. The Federal Government ensures coordination and timely utilization and release of sums from USF.

Kazakhstan

General protection of consumer rights is regulated by the Law on Protection of Consumer Rights, while the rights of telecommunication service consumers and data protection are provided in the Law on Communications and the Rules of Provision of Telephone Communication Services.

Tariffs for universal telecommunication services are state regulated and approved by the Committee. Universal service operators are selected on a competitive tender basis, or if that fails, imposed on the dominant telecommunication network operator. Losses incurred by a designated operator are subsidized, except for losses in urban areas. To calculate the subsidy, the operator must maintain accounting separation of costs and revenues.

Turkmenistan

The Law on Communications contains provisions regarding consumer protection, including a brief statement of the rights and obligations of consumers. The rights of consumers include access to telecommunication services, security of telecommunication services, carrier selection, obtaining information on services provided, and conditions of the service termination, right of appeal against actions of operators to "higher bodies" or court. It also provides that telecommunication operators must ensure and be responsible for consumer data protection.

The Law on Communications does not state a universal service definition, minimum set of services and the framework for the provision of universal services by operators, including their specific obligations. The obligations of operators refer to providing free access to emergency services to the users. There is no universal service fund.

Uzbekistan

According to Article 23 of the Law on Telecommunications the users, among other rights, have the right to compensation for losses, moral damages as a result of refusal to provide services by operator or the provision of telecommunications services of inadequate quality.

The Ministry of Development of Information Technologies and Communications establishes the tariffs for universal services in coordination with the Ministry of Finance of the Republic of Uzbekistan.

6.3. Identification of the existing constraints (legal, technical, financial/economic, regulatory) preventing the maximum exploitation of access to communications infrastructure

The existing legal framework of the telecommunications sector in almost all ECO Member States is not harmonized and not oriented to ensuring convergence of the technologies and creation of an information society, based on well-developed infrastructure with high and super high speeds of the transmission. Some laws from the package of laws on information society were approved and implemented, others are still being drafted or not yet prepared.

The current licensing regime in telecommunications of the ECO Member States, except Turkey, involving the issuance of standard and individual licenses for different types of services and activities of the sector, played its role during the transition period from monopoly to the introduction of competition in the telecommunications market. In light of the convergence between telecommunications, radio communications and information technology it becomes quite problematic to use the existing licensing and authorization regime.

The validity period of a license in Tajikistan (from 3 to 7 years) and in Turkmenistan (3 years) is very short for some activities that imply network building and big capital injections and not sufficient for investments recovery, leading to the lack of interest of investing in the development of the ICT sector.

Very high fees for licenses in Pakistan and Azerbaijan discourage the potential service providers to enter market. In Afghanistan, besides the state taxes and spectrum usage fees, the mobile cellular service providers have to pay every year license fees in the amount of 10% of the gross revenues and all licensed network providers have to contribute with 2.5% of the gross revenues to the Telecommunications Development Fund.

The National Radio Frequency Table of Azerbaijan, Kazakhstan, Kyrgyzstan and Uzbekistan do not include categories of use of radio frequencies, such as the governmental use, non-governmental (civil) use and shared use. This means that a large part of the frequency spectrum remains controlled by the military and an approval is required from the military institution for civilian purposes. In such a case all civil or non-governmental applicants pass a longer procedure that does not contribute to a faster development of the sector.

There are no obligations to prepare and publish Reference Interconnection Offers (RIO) in Azerbaijan, Iran, Tajikistan. The interconnection conditions in Kazakhstan with operators with dominant position in the market are regulated by a standard Interconnection Agreement.

The physical infrastructure sharing is not regulated in Uzbekistan and in Pakistan passive/physical infrastructure sharing is not mandatory. The main difficulties related to interconnection that could be improved in Pakistan refer to additional legal provisions to be included in the legal act in order to ensure better interconnection and access to associated facilities.

In Azerbaijan, Kyrgyzstan, Turkmenistan and Uzbekistan the ex-ante competition safeguard mechanism is not applied.

6.4. Recommendations for the improvement of the policy, legal and regulatory environment for ICT sector

Based on the analysis of the existing legal framework, regulatory and institutional system in the ICT sectors of the ECO Member States, the following recommendations and suggestions are proposed.

Recommendations on the legal framework in the ICT sector of the ECO Member states

Iran should create a legal framework for the development of telecommunications sector and especially adopt the basic Law on Communications/Telecommunications/ Electronic Communications, which establishes the main rules in the telecommunications sector, conditions for operation and provision of telecommunications networks and services, defines the competences of the administrative bodies that are

governing the sector, establishes the competition rules and the licensing regime, management of scarce resources, as well as the rights and obligations of operators and service providers consumers protection and dispute resolutions.

The ECO Member States should establish the legal framework oriented towards the development of the information society. The Electronic Signature Law should be approved and implemented in Afghanistan, Iran, Kazakhstan, Pakistan and Turkmenistan. Afghanistan, Pakistan and Uzbekistan should adopt and implement Data Protection Law. Turkey should implement Data protection Law. Cybercrime legislation should be adopted in Afghanistan.

The investment climate should be improved that will allow a safe and long-term activity for both foreign investments, as well as domestic investors. It is also useful to develop public private partnerships (PPP).

Recommendations for the creation of independent regulatory authorities

The independent national regulatory authority, which was granted with sufficient flexibility and autonomy in decision making and in using regulatory instruments, can perform its role in encouraging innovation, future growth and sustainable development of the regulated sector.

The high level of infrastructure investments in ICT requires long-term planning which can offer well established independent regulatory authority that is detached from the relatively short-term political cycle of elections. Based on that Azerbaijan, Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan should set up a separate and independent national regulatory authority (NRA). The requirements and conditions for the establishment and operation of regulatory bodies should be stipulated in the relevant legal and normative acts, laying down the tasks of the NRA, clearly divide the regulatory function from policy one and establish a set of procedures to ensure the harmonized application of the regulatory framework.

NRAs in Iran and Kyrgyzstan should establish a board, council or commission consisting of more than 3 members, including the head of the board. The number of members should be uneven A board, council or commission offers more opportunities for a collegial decision making on regulatory subjects.

The head and the board members of NRAs in Afghanistan, Iran, Pakistan, Turkey, Kyrgyzstan should be appointed and dismissed by the Parliament, following the relevant Ministry or Government proposal. The independence will be higher when the nomination and dismissal is confirmed by the Parliament, or by a mixed interaction of the executive and legislative.

An office term for the head of the regulatory body and the board members should be established in Afghanistan, Iran and Kyrgyzstan. This term can vary from four to six years, with the opportunity to have the contract renewed once or twice. With a guaranteed term of office, the head of the NRA and members of the board can exercise regulatory power without being undermined by short term political interests.

The grounds for discharge and dismissal of board members and head of NRA In Afghanistan, Iran and Kyrgyzstan as well as procedures for clarification and appeal against dismissal should be stipulated by Law.

The NRA in Kyrgyzstan and Iran should be given the right to approve regulations related to the regulated sectors, without any other approval or confirmations from other bodies. This measure is required so that the NRA adopts timely effective regulations.

CRA in Iran should be given the functions of licensing, price regulation, numbering assignment, universal service/access regulation in ICT and remove this right from the Ministry of ICT and other state bodies.

The regulatory functions, which are in responsibility of the respective Ministry of Turkey related to the right to open tender procedures directly on its own, issue authorizations for services with the use of frequency resources on the national scale and the regulations and implementation of universal service, the management of the universal service fund should be transferred in the responsibility of ICTA.

The NRAs in Afghanistan, Iran and Kyrgyzstan should have the right to approve and decide upon their budget. The NRA's approved budget and how it was spent should be made public. On the other hand an independent audit of the NRA's budget spending should be established.

The CRA' leadership in Iran should have the right to set its own structure. In Pakistan and Kyrgyzstan the head and members of the Board and also employees of NRA should be exempted from civil service salary limits.

ICTA in Turkey and SAC in Kyrgyzstan should have legal obligations and conduct public consultations before taking regulatory decisions.

Access to the market: issuance of licenses and authorizations

The validity period of a license in Tajikistan and Turkmenistan should be extended up to 15 -25 years for activities that imply network building and big capital injections in order to be sufficient for investments recovery and facilitate investments in the sector.

The licenses fees should be lowered in Pakistan and Azerbaijan and establish a reasonable fee for licenses, in order to not discourage the potential service providers to enter market. Annual license fees for mobile cellular service providers should be lowered or excluded in Afghanistan.

In order to ensure the development of competition in all segments of the telecommunications market under the condition of convergence, which is now happening in the ICT domain, the principle of technological neutrality and a simplified licensing regime should be introduced that will eliminate binding to a new technology or standard.

In order to ensure an appropriate regulatory mechanism in the telecommunications sectors of the ECO Member States aimed at addressing these problems, it is recommended for ECO Member States, except Turkey, to switch to the general authorization and licensing regime stipulated by the Directive of the European Union 2002/20/EC on the authorization of electronic communications networks and services.

By developing and adopting the Directive 2002/20/EC, the European Union incorporated the world's best practices and identified the answers to the questions that are faced in the sector in terms of authorization and licensing. The experience of EU Member States establishing the general authorization regime that has a notification procedure for activities related to ICT and the license issuance only for limited resources will solve many problems in terms of licensing and authorization in ICT. This approach will facilitate market access and reduce administrative barriers for the entry of operators and providers in all segments of the telecommunications market, create conditions for an innovative development of the market and will allow operators to timely introduce new technologies and services.

Regulating limited resources: radio frequencies and numbering resources regulation

The radio frequencies conversion should be completed in Kyrgyzstan and Turkey. It is advised to analyze the National Radio Frequency Table of Azerbaijan, Kazakhstan, Kyrgyzstan and Uzbekistan and identify the category of use for radio frequency bands, as well as include for each radio frequency band its category of use (governmental (military, other governmental purposes) use, non-governmental (civil) use and shared use). As a result the Ministry of Communications or the National Regulatory Authority could independently assign radio frequencies for non-governmental (civil) use.

For an efficient use of wireless technology the ECO Member States should do the spectrum refarming to clear frequencies from low-value networks and technologies (by economic and/or social criteria) and reassign to high-value applications.

The transition from analogue to digital broadcasting should be accomplished in Pakistan and the digital dividend should be reallocated in Afghanistan, Iran and Pakistan. The spectrum rights trading should be allowed in Afghanistan, Iran, Kyrgyzstan and Pakistan. Pakistan should also implement the mobile number portability.

In the Law or relevant regulations of Kazakhstan a term should be established for the allocation and use of radio frequency spectrum.

As mentioned above the validity period for assigning the numbering resources is 1 year and can be renewed. According to the By-Law on numbering, the usage duration of the assigned numbers is limited with the duration of relevant authorization.

However, the fees for right of use of numbering resources are collected from operators in proportion with the amount of numbers to be assigned. Operator pays the fee for right of use of numbering resources latest by the end of January each year. If not paid within the two months period following the end of January, the right of use shall be accepted to be terminated without any process.

Due to the fact that one year validity for assigning numbering resources in Turkey is too short for the service provision it is recommended to be extended until the validity of authorized services, but not less than 10 years.

Regulating access to the networks and services

The roll-out of high-speed fixed and wireless networks requires substantial investments, a significant proportion of which is represented by the cost of civil engineering works. A major part of those costs can be attributed to inefficiencies in the roll-out process related to the use of existing passive infrastructure (ducts, conduits, manholes, cabinets, poles, masts, antenna installations, towers and other supporting constructions), bottlenecks related to coordination of civil works, burdensome administrative permit granting procedures, and bottlenecks concerning in-building deployment of networks, which lead to high financial barriers, in particular in rural areas.

In order to reduce the costs of broadband roll-out, all ECO Member Countries should create and implement the legal framework on physical infrastructure sharing. As a good practice they can refer to the Directive 2014/61/EU on measures to reduce the cost of deploying high-speed electronic communications networks of 15 May 2014. The Directive aims to facilitate the roll-out of high-speed electronic

communications networks by promoting the joint use of existing physical infrastructure and by enabling a more efficient deployment of new physical infrastructure so that such networks can be rolled out at lower cost.

Almost all ECO Member States especially Azerbaijan, Iran, Tajikistan and Kazakhstan should impose the obligation on the Operator with Significant Market Power (SMP) to prepare and publish Reference Interconnection Offers (RIO) and Reference Offer for the Access to the Local Loop and Access to Associated Facilities (RUO). The standard RUO should contain a detailed description of each network element or the associated infrastructure in accordance with the market needs, technical and commercial conditions: information on technical specifications, network characteristics, terms of delivery and use, applied tariffs that correspond to each of these elements. The RUO should include conditions of access to related physical infrastructure (sewage channels, places for co-location, ducts and masts and other infrastructure). Fees for the use of associated physical infrastructure should be cost-oriented and promote market access for new operators.

Protection of competition

Azerbaijan, Kyrgyzstan, Turkmenistan and Uzbekistan should implement an ex-ante regulation of competition in the relevant markets. In order to implement this mechanism relevant markets need to be identified and analyze the situation in these markets in view of sufficient level of competition. There should be designated operators or providers with significant or dominant position in the relevant markets and imposing, maintaining, modifying or canceling certain ex-ante appropriate market remedies on those operators in order to protect competition.

6.5. Priority areas for cooperation

The proposed priority areas for the cooperation among the ECO Member States are information society development and ensuring access to affordable broadband. Regional cooperation should be oriented to ensure access of the ECO Member States to affordable international bandwidth, which is an essential component of ICT and broadband development. In that respect, projects on the construction of high-capacity regional, sub-regional fiber networks and inter-counters cross border fiber optic links, which can provide and diversify access to the international bandwidth, should be promoted. The ECO Member States are encouraged to create conditions oriented to reducing the costs of regional infrastructure roll-out by establishing favorable conditions of right-of-way and physical infrastructure sharing.

The ECO region should develop a modern internal infrastructure and promote infrastructure projects that have the goal to improve fixed and mobile broadband connectivity by the deployment of infrastructure across the countries, especially stressing on the development in rural areas, and increase the speed of data transmission on the Internet. The ECO Regional Strategy for Broadband Development should be envisaged that will establish key priorities, targets and milestones, long-term objectives, plans and projects to implement the strategy.

There is also a need to cooperate on the coordination and harmonization of radio spectrum use for flexibility and availability of radio spectrum for wireless broadband communications.

The ECO Member States should develop the information society and establish a harmonized legal framework in their countries oriented towards the development of the information society. The ECO Regional Strategy for Information Society Development should be adopted.

With access to smart phones or other mobile devices by a growing number of people coupled with broadband access, these devices can be used to provide all kind of information society services ranging from citizen services to disaster management, health, education, etc. The ECO Member States should promote applications for the information society services in order to reduce the digital divide and bring improvement in the citizen's lives.

Establishing an effective regulatory framework and institutional system of ICT regulation, as well as ensuring independent and effective functioning of the national regulatory authorities as an important element of the management of the sector and guarantee of investments is another area of proposed cooperation among the ECO Member States. In that respect building the capacities of the institutions and consolidating the investment efforts are very important.

The countries should cooperate for the development of local content and improve the human capital by increasing adult literacy and ICT literacy of the population.

Additionally, the ECO Member States should cooperate in order to fight against cybercrime, take consolidated actions that would ensure cyber security in the ECO region and the protection of users and children in the online environment.

7. Conclusions

The ECO Member States are making significant efforts in the development of the information society and ICT infrastructure. One of the main goals of these countries is to integrate into the global information society and bridging the digital divide. Regional cooperation will facilitate the achievement of this goal by the deployment of regional and national broadband infrastructure, facilitating access to the international canal of the high capacity, providing the opportunity to create a single information space and conditions for the development of the Information Society as one of the directions to build a "digital economy."

The ECO Regional Strategy for Information Society Development and the ECO Regional Strategy for Broadband Development can serve as strategic documents and action plans for the ICT regional cooperation.

The inclusion in the ICT development policy and strategy documents of goals and objectives, such as the development of broadband services, deployment of access to subscribers based on NGA, use of the "digital dividend" for development of wireless broadband access, will serve preparing the strategic direction of ICT infrastructure development and modernization in line with global development trends.

In order to ensure the good functioning of the sector, an effective legal and regulatory framework should be developed and implemented. As experience shows, it leads to economic growth, increased investments and lower prices. It also improves service quality, expands distribution of services and accelerates technological innovation in the sector.

Establishing an effective institutional system of regulation in the ICT sector and a clear division of functions between the management bodies of the sector, ministry and regulator, as well as ensuring independent and effective functioning of the national regulatory authority are important elements of the management of the sector and guarantee of investments.

As a result of increased technology convergence is important to implement the general authorization and licensing regime in the ECO Member States based on the provisions of the Directive of the European Union 2002/20/EC on the Authorization of Networks and Electronic Communications Services. This licensing regime will facilitate timely access to the market of new technologies, services and suppliers.

Improving the conditions of sharing and access to physical infrastructure can reduce costs and significantly accelerate the deployment of NGA networks that will also enhance competition.

Internet bandwidth and national backbone capacities are important building blocks for providing affordable high-speed Internet access. They remain a major challenge in many lower-income countries, particularly in landlocked developing states. The implementation of regional infrastructure projects will ensure direct access to cost-effective IP transit capacity and offer connection of the regional less-developed broadband markets, especially in landlocked countries, with the international IP canals of high-capacity.

The regional cooperation will also contribute to sharing experiences, build the capacities of the institutions and consolidate investment efforts to implement large scale projects that otherwise wouldn't be possible for a single country or operator.

Annex 1. Country profiles

Afghanistan	2014
Region	Southern Asia
Surface area (square kilometers)	652864
Population	31,627,506
Population density in 2014 (per square kilometers)	48
Population growth rate (average annual %)	3.0
Urban population (%)	26
GDP: Gross domestic product (million current US$)	20,038
GDP per capita (current US$)	633.6
GDP growth rate (%)	1.3
Human Development Index (HDI), HDI ranking	0.465, 171
Literacy rate (%)	31.7
ICT Development Index (IDI), IDI ranking 2015	1.83, 156
E-Government Development Index (EGDI), EGDI ranking	0.1900/ Low, 173
Fixed - telephony subscriptions (per 100 inhabitants)	0.33
Mobile-cellular subscriptions (per 100 inhabitants)	74.88
Individuals using the Internet (%)	6.39
Broadband subscriptions	1,500
Fixed- telephony operators	1. Afghan Telecom Corporation (Aftel) (PSTN & CDMA) 2. Wasel Telecom (Local Fixed Service Provider via CDMA)
Mobile operators	1. Roshan 2. MTN 3. Afghan Wireless Communications Company (AWCC) 4. Etisalat 5. Afghan Telecom Corporation (Aftel)
Internet service providers	1. Insta Telecom 2. Neda Telecommunications 3. Sarferaz Bahader 4. KBI 5. Ceretechs 6. New Dunia 7. Io Global 8. Rana Technologies 9. Multinet 10. Netzone

	11. Afghan Cyber
	12. ASIX
Fixed broadband technologies	ADSL, FTTx, Wi-Max
Mobile broadband standards	3G launched in 2012; 4G LTE expected in 2015
International internet bandwidth	15 Gbps
International internet bandwidth per capita	0.5 Kbps
Policy maker	Ministry of Communications and Information Technology
Regulatory authority	Afghanistan Telecommunications Regulatory Authority (ATRA)

The national operator, government-owned Afghan Telecom Corporation (Aftel) started offering fixed service in April 2006. It operates PSTN infrastructure in the main cities and in other areas provides fixed telephony via a CDMA network. In the PSTN network 30 % of exchanges are digital. Wasel Telecom operates as a local fixed service provider and offers CDMA-based wireless local loop service, focusing primarily in rural areas that had been underserved.

The competition in mobile market was introduced in 2003 and now Afghanistan has a highly competitive mobile market with six mobile operators Roshan, Etisalat, MTN, AWCC, Wasel and Salaam. Five of them provide 2G and 3G services and Wasel offers CDMA. Almost 90% of the population is covered by a mobile-cellular network and 20% with 3G. There are 24,526,022 mobile cellular subscribers.

There were around 60 Internet service providers, including two Wi-Max. Major Internet service providers are Insta Telecom, Neda Telecommunications, Sarferaz Bahader, KBI, Ceretechs, New Dunia, Io Global, Rana Technologies, Multinet, Netzone, Afghan Cyber, and ASIX.

ADSL was offered first time in 2011 with speeds ranging from 256 Kbps to 4 Mbps. The implementation of 3G mobile broadband services has rapidly expanded Internet access in the country.

Azerbaijan	2014
Region	Western Asia
Surface area (square kilometers)	86600
Population	9,593,000
Population density in 2014 (per square kilometers)	111
Population growth rate (average annual %)	1.3
Urban population (%)	54
GDP: Gross domestic product (million current US$)	75,198
GDP per capita (current US$)	7,884.2
GDP growth rate (%)	2.0
Human Development Index (HDI), HDI ranking	0.751, 78
Literacy rate (%)	99.8
ICT Development Index (IDI), IDI ranking 2015	5.79, 67
E-Government Development Index (EGDI), EGDI ranking	0.5472/ High, 68
Fixed - telephony subscriptions (per 100 inhabitants)	18.87
Mobile-cellular subscriptions (per 100 inhabitants)	110.91
Individuals using the Internet (%)	61.00
Broadband subscriptions	1,887,070
Fixed- telephony operators	1. Aztelekom (Gov't. of Azerbaijan) 2. Baku Telephone Network Production Association (BTRIB) (Gov't. of Azerbaijan) 3. Caspian Telecom (Castel) 4. Aztrank 5. Azeurotel 6. Ultel
Mobile operators	1. Azercell (Fintur Holdings B.V. (TeliaSonera 58%, Turkcell 42%)) 2. Bakcell (GTIB) 3. Nar Mobile (Azerfon) 4. Aztelekom CDMA 5. Aztrank CDMA 6. Baku Telephone Communications CDMA 7. Naxtel CDMA 8. Ultel CDMA
Internet service providers	1. Bakinter.NET (Gov't. of Azerbaijan)

	2. Aztelekomnet/Aztelecom (Gov't. of Azerbaijan)
	3. Azdatacom (Gov't. of Azerbaijan)
	4. Alfanet
	5. AzQtel
	6. Connect
	7. Dataplus
	8. Uninet
	9. AgTelecom
	10. Caspian Telecom
	11.Azstarnet
Fixed broadband technologies	ADSL, FTTH, Wi- Fi
Mobile broadband standards	3G service launched in late- 2009; 4G trials started in 2012
International internet bandwidth	205 Gbps
International internet bandwidth per capita	22.4 Kbps
Policy maker	Ministry of Communications and High Technologies
Regulatory authority	Regulatory Department within the Ministry of Communications and High Technologies

There are 1,795,448 fixed telephony subscribers in the country. Azertelecom, incumbent operator, provides the fixed-telephony services nationwide, the Baku Telephone Network Production Association (BTRIB) is the largest fixed-line operator in the capital Baku. Both are government- owned companies.

Other smaller fixed-line operators are Aztrank, Azeurotel, Caspian Telecom (Castel), and Ultel and they offer services to business customers. The mobile market is served by eight operators. Azercell, the country's largest mobile operator launched its network in 1996. Azercell's market share is approximately 51 percent; second-place Bakcell has an estimated share of 31 percent, and Azerfon has an estimated 18 percent share.

Azerfon first launched 3G mobile services in 2009. In 2012 Bakcell was leader in mobile broadband, with a 45 percent market share following the launch of its 3G services in 2011.

Five operators provided CDMA service as of 2013, namely Aztelekom, Aztrank, Baku Telephone Communications, Naxtel, and Ultel. Each mobile operator is going to develop 4G services in Baku. Azercell launched a commercial 4G LTE service in Baku in 2012.

On the Internet market are active more than 30 ISPs. Government owned ISPs Bakinter.NET and Aztelekom have shares of 23% and 16%, respectively, while Uninet has a 12% share and Azeronline - 10% share.

In Azerbaijan there are 1,887,070 fixed broadband subscribers, with 19.83% of fixed broadband penetration rate.

Iran, Islamic Rep.   **2014**

Region	Southern Asia
Surface area (square kilometers)	1628750 (land area only)
Population	78,143,644
Population density in 2014 (per square kilometers)	48
Population growth rate (average annual %)	1.3
Urban population (%)	73
GDP: Gross domestic product (million current US$)	425,326
GDP per capita (current US$)	5,442.9
GDP growth rate (%)	4.3
Human Development Index (HDI), HDI ranking	0.766, 69
Literacy rate (%)	84.3
ICT Development Index (IDI), IDI ranking 2015	4.79, 91
E-Government Development Index (EGDI), EGDI ranking	0.4508/ Middle, 105
Fixed - telephony subscriptions (per 100 inhabitants)	38.98
Mobile-cellular subscriptions (per 100 inhabitants)	87.79
Individuals using the Internet (%)	39.35
Broadband subscriptions	7,425,807
Fixed- telephony operators	1. Telecommunications Company of Iran (TCI) 2. Jame Novin Communication 3. Zoha-Kish Telecom 4. Iraphone 5. Kooh-E-Noor Telecom 6. Montazeran Adl Gostar
Mobile operators	1. Mobile Communication Co. of Iran (MCI) (TCI subsidiary) 2. MTN Irancell (Iran Electronic Development Co./MTN) 3. Tamin Telecom (Rightel brand) 4. Taliya
Internet service providers	1. Telecommunications Company of Iran (TCI) 2. Pars Online 3. ShaTel 4. Datak Telecom 5. Sepanta Network Solutions 6. Neda Rayaneh 7. Iranian Net 8. Pishgaman 9. Afr@net

Fixed broadband technologies	ADSL, WiMax, FTTH
Mobile broadband standards	3G launched in 2012; 4G LTE launch in 2014
International internet bandwidth	113 Gbps
International internet bandwidth per capita	1.5 Kbps
Policy maker	Ministry of Communications and Information Technology
Regulatory authority	Communications Regulatory Agency

Competition in the Iran's telecommunications markets was introduced in 2003, but is still limited, with a near-monopoly in the fixed telephony sector.

The country's incumbent operator, TCI, has a 90% share of the fixed telephony market and 100% of exchanges are digital in the fixed network, including rural areas. Five private, regional operators share 10% of the market. The penetration rate is high and represents almost 39%.

In the mobile sector the competition was introduced in 2003. Mobile Communication Co. of Iran (MCI), TCI's mobile arm, is the market leader with a 60% share. MTN Irancell has a 36% share. Both provide GSM services and are going to deployed UMTS and LTE networks. A third operator, Tamin Telecom, offers mobile services under the Rightel brand name and has 3% of the market, it was granted exclusivity in the 3G market until mid-2014, at which point both of the country's major mobile operators, MCI and MTN Irancell, announced that they would launch both 3G and 4G services. The operators Taliya and TKC offers GSM services and have less that 1 % of the market. The development of the mobile broadband market have been delayed due to the exclusive right over the 3G that was granted to Tamin Telecom,

The Internet market, while served by hundreds of licensees (1051), is led by a limited number of entities offering broadband service.

The market is served by four operators, among them TCI is the biggest ISP in the country with 58 % of the market. TCI launched ADSL service in 2004.

Privately-owned Aria ResanehTadbir (10.6 %), EnteghalDadeh Asia Tech (8.3 %), Pars Online (6.7 %) are the country's largest private data network operators, handling 25.6 % of the country's domestic data traffic. Another ISP, Iranian Net, is in the process of implementing fiber-to-the-home networks in at least seven major cities.

Kazakhstan	2014
Region	Central Asia
Surface area (square kilometers)	2724900
Population	17,289,111
Population density in 2014 (per square kilometers)	6
Population growth rate (average annual %)	1.5
Urban population (%)	53
GDP: Gross domestic product (million current US$)	217,872
GDP per capita (current US$)	12,601.7
GDP growth rate (%)	4.4
Human Development Index (HDI), HDI ranking 2015	0.788, 56
Literacy rate (%)	99.7
ICT Development Index (IDI), IDI ranking 2015	6.20, 58
E-Government Development Index (EGDI), EGDI ranking	0.7283/ High, 28
Fixed - telephony subscriptions (per 100 inhabitants)	26.12
Mobile-cellular subscriptions (per 100 inhabitants)	168.62
Individuals using the Internet (%)	54.89
Broadband subscriptions	2,148,000
Fixed- telephony operators	1. Kazakhtelecom (Gov't. of Kazakhstan) 2. KazTransCom 3. Transtelecom 4. Ducat (Arna) 5. VimpelCom (CATelecom, TNSplus) 6. Sky Silk
Mobile operators	1. Kcell / Activ (Fintur Holdings (TeliaSonera, Turkcell) 2. Beeline / KaRTel (VimpelCom) 3. Tele2 4. Altel (Kazakhtelecom)
Internet service providers	1. Kazakhtelecom/iD Net/Megaline 2. KazTransCom 3. Transtelecom 4. Ducat (Arna) 5. Astel 6. VimpelCom (CATelecom, 2Day Telecom)
Fixed broadband technologies	ADSL, FTTH, WiFi
Mobile broadband standards	3G launched in 2010; 4G LTE launched in 2013
International internet bandwidth	275 Gbps

International internet bandwidth per capita	16.5 Kbps
Policy maker	Ministry for Investment and Development
Regulatory authority	Communication, Informatization and Information Committee of the Ministry for Investment and Development of the Republic of Kazakhstan

The incumbent operator Kazakhtelecom is dominant in the country's fixed telephony sector, with a market share of 93%. The majority owner of Kazakhtelecom is the Government of Kazakhstan, which holds 51% of shares. Other fixed-line operators include KazTransCom, Transtelecom, Ducat (Arna), GC Beeline and Sky Silk.

As of March 2015, there were four mobile telephone service providers in Kazakhstan, Kcell with 50% of the market share, VimpelCom with 32 %, Tele2 13 %, and Altel 5 %. Three of them use the GSM 3G standard (Kcell, Beeline, and TELE2). All GSM operators are privately owned, with large foreign participation in ownership. The fourth largest national mobile operator is fully owned by Kazakhtelecom and till 2015 was a single 4G operator in the country. 3G services were launched in 2010 and 4G LTE was launched in 2013.

At the beginning of 2015 Kcell, Beeline, and TELE2 obtained the LTE licenses. However they should develop networks based on the early assigned frequencies, applying the regime of technological neutrality: operators may decide what frequencies use for 2, 3 or 4G. The tender for new 4G frequencies is planned for 2017.

Although in 2014 fixed-broadband was around 13 % of the population, Kazakhstan's strong fixed infrastructure permits future growth in the fixed-broadband sector.

As of year-end 2014 there were 2,148,000 broadband subscribers and Kazakhtelecom the largest ISP in the country, with a 70 % share of the market. The Internet market is served also by KazTransCom, Transtelecom, Ducat, Astel, VimpelCom and other ISP. The technologies used for fixed broadband deployment are ADSL, FTTH and Wi-Fi.

Kazakhtelecom was expected to provide fiber-to-the-home connectivity to all multi-story, multi-family residential units in Kazakhstan in 2015. Kazakhtelecom's iDNet FTTH service offers download speeds of up to 50 Mbps. On its part VimpelCom increases subscribership to its fiber-to-the-building network.

Kyrgyzstan	2014
Region	Central Asia
Surface area (square kilometers)	199949
Population	5,834,200
Population density in 2014 (per square kilometers)	30
Population growth rate (average annual %)	2.0
Urban population (%)	36
GDP: Gross domestic product (million current US$)	7,404
GDP per capita (current US$)	1,269.1
GDP growth rate (%)	3.6
Human Development Index (HDI), HDI ranking	0.655, 120
Literacy rate (%)	99.2
ICT Development Index (IDI), IDI ranking 2015	4.62, 97
E-Government Development Index (EGDI), EGDI ranking	0.4657/ Middle, 101
Fixed - telephony subscriptions (per 100 inhabitants)	7.88
Mobile-cellular subscriptions (per 100 inhabitants)	134.46 (end 2014) 129 (end 2015)
Individuals using the Internet (%)	28.30
Broadband subscriptions	233,903
Fixed- telephony operators	1. Kyrgyztelecom (Gov't. of Kyrgyzstan) 2. Saima Telecom
Mobile operators	1. MegaCom 2. SkyMobile/Beeline (VimpelCom) 3. NurTelecom 4. Saima Telecom 4G 5. Katel (DAMPS) 6. Aktel (CDMA)
Internet service providers	1. Kyrgyztelecom 2. Megaline 3. Saima Telecom 4. Elcat
Fixed broadband technologies	ADSL, FTTH
Mobile broadband standards	3G launched in 2010; 4G LTE launched in late 2011
International internet bandwidth	5 Gbps
International internet bandwidth per capita	0.893 Kbps
Policy maker	Ministry of Transport and Communications

Regulatory authority	State Agency for Communications under the Government of the Kyrgyz Republic

As of 1st of January 2015 there are three major suppliers on the fixed telephony market. The main operator of the fixed telephony in Kyrgyzstan is the open joint-stock company "Kyrgyztelecom". JSC "Kyrgyztelecom" with the state ownership has 89% of market share. Kyrgyztelecom holds a dominant position in the fixed telephony market and its position is strong enough. Beginning with 2003 a few attempts were made to privatize Kyrgyztelecom, but all of them were unsuccessful. In addition to its PSTN fixed network where 100 % of exchanges are digital, Kyrgyztelecom also offers fixed wireless local loop (WLL) service via a CDMA-450 network. The largest alternative operators are Saima Telecom and LLC "Vinlayn" which are oriented to provide services in Bishkek and Chui.

Mobile communication service is the most significant segment of the communications sector – around 66.5 %. At the end of 2014 the density of mobile phones was 134.5 units per 100 inhabitants with 7,563,444 subscribers of mobile communication services. There are 3 major mobile communication operators which provide services in GSM, CDMA 450, 3G and LTE standards. The mobile sector is led by two Russian- owned operators, MegaCom and VimpelCom. 3G services were launched in 2010. The Regulator awarded in 2011 4G LTE and Wi-Max licenses to all mobile operators in the country. Saima Telecom launched its 4G LTE network in Bishkek in December 2011. In 2014 the population covered by a mobile-cellular network constituted 97,5 % and the population covered by at least a 3G was 57 %.

There were 1 861 273 fixed (wired) broadband subscribers and 2 293 044 active mobile-broadband subscribers at the end of 2014. More than 30 ISP operate on the market and Kyrgyztelecom is the country's leading ISP, with a market share of 60%. Other major ISPs are Elcat, Megaline, and Saima Telecom. Various Internet access technologies such xDSL, FTTx, Wi-Fi and 4th generation access technology WiMAX and LTE are being used. Especially popular are the public Internet access points - Internet cafes. The speed of broadband Internet is from 24 Mbit /s. for DSL connection up to 100 Mbit/s. for FTTx (fiber optic network), which is well developed in the capital - Bishkek. There is currently a tendency to develop Internet in the regions due to the coverage of 97.5% of the inhabited territory of Kyrgyzstan. This allows touse wireless Internet practically anywhere in the country.

Pakistan	2014
Region	Southern Asia
Surface area (square kilometers)	796095
Population	185,044,286
Population density in 2014 (per square kilometers)	240
Population growth rate (average annual %)	2.1
Urban population (%)	38
GDP: Gross domestic product (million current US$)	243,632
GDP per capita (current US$)	1,316.6
GDP growth rate (%)	4.7
Human Development Index (HDI), HDI ranking	0.538, 147
Literacy rate (%)	54.7
ICT Development Index (IDI), IDI ranking 2015	2.24, 143
E-Government Development Index (EGDI), EGDI ranking	0.2580/ Middle, 158
Fixed - telephony subscriptions (per 100 inhabitants)	2.65
Mobile-cellular subscriptions (per 100 inhabitants)	73.33
Individuals using the Internet (%)	13.80
Broadband subscriptions	2,008,684
Fixed- telephony operators	1. Pakistan Telecommunications Company, Ltd. (PTCL) 2. WorldCall Telecom, Ltd. (Omantel subsidiary) 3. Wateen Telecom (Pvt.), Ltd. (Abu Dhabi Group) 4. TeleCard, Ltd. (GoCDMA brand) 5. Wi-Tribe Pakistan, Ltd. (Ooredoo subsidiary) 6. National Telecommunications Corp. (NTC) (Pakistani Government.) 7. Sharp Communications (Pvt.), Ltd. (Qubee brand) (Augere Holdings) 8. Link Direct International (Pvt.),
Mobile operators	1. Pakistan Mobile Communications, Ltd. (Mobilink brand) (VimpelCom subsidiary) 2. Telenor Pakistan (Telenor Group) 3. Zong (China Mobile Pakistan) 4. Pak Telecom Mobile (Ufone brand) (PTCL subsidiary) 5. Warid Telecom, Ltd. (Abu Dhabi Group)
Internet service providers	1. Pakistan Telecommunications Company, Ltd. (PTCL) 2. Wateen Telecom (Pvt.), Ltd. (Abu Dhabi Group) 3. WorldCall Telecom, Ltd. (Omantel subsidiary)

	4. Wi-Tribe Pakistan, Ltd. (Ooredoo subsidiary) 5. Sharp Communications (Pvt.), Ltd. (Qubee brand) (Augere Holdings)
Fixed broadband technologies	ADSL, EvDO, Wi-Max, Cable Modem, FTTH
Mobile broadband standards	3G and 4G LTE launched in 2014
International internet bandwidth	300 Gbps
International internet bandwidth per capita	1.7 Kbps
Policy maker	Ministry of Information Technology and Telecommunication
Regulatory authority	Pakistan Telecommunication Authority (PTA)

Competition in fixed-telephone market was introduced in 2003-2004. Pakistan's incumbent operator, PTCL, is majority-owned by the Government and has retained a 96% share of PSTN fixed-telephony subscribership, but WLL operators have captured a significant share of the overall fixed market, reducing PTCL's overall market share in the sector to 65%. Major WLL operators include Wateen, Telecard and Wi-Tribe.

Competition in the mobile sector was introduced in 2004 and this sector is more competitive than the fixed-telephony sector, with the five relatively strong operators. Mobilink, a subsidiary of VimpelCom, has 29.2% market share. Mobilink benefited from a majority of the mobile market prior to its deregulation in 2004 and has been the market leader ever since. Telenor was ranked second, with 27.7%, China Mobile's Zong has 19.3%, PTCL's Ufone subsidiary has a 15.3% share and Warid Telecom has 8.5%. In 2014 percentage of the population covered by a mobile-cellular network is 92% and percentage of the population covered by at least a 3G mobile network is 33%. In May 2014 Zong, Ufone, Telenor, and Mobilink launched 3G services. In September 2014 Zong launched 4G services in seven major cities of the country.

PTCL's share of the fixed broadband market rose by 3 percentage points in 2014, to 72% or 1.9 million subscribers, with much of the growth attributed to its wireless EvDO connections. Second-place Wateen had 10% of the broadband market, while WorldCall and WiTribe each had 7%. WiMax operator Qubee had a 2% share.

Tajikistan	2014
Region	Central Asia
Surface area (square kilometers)	142600
Population	8,295,840
Population density in 2014 (per square kilometers)	59
Population growth rate (average annual %)	2.2
Urban population (%)	27
GDP: Gross domestic product (million current US$)	9,242
GDP per capita (current US$)	1,114.0
GDP growth rate (%)	6.7
Human Development Index (HDI), HDI ranking	0.624, 129
Literacy rate (%)	99.7
ICT Development Index (IDI), IDI ranking 2015	No data
E-Government Development Index (EGDI), EGDI ranking	0.3395/ Middle, 129
Fixed - telephony subscriptions (per 100 inhabitants)	5.24
Mobile-cellular subscriptions (per 100 inhabitants)	95.13
Individuals using the Internet (%)	17.49
Broadband subscriptions	6,100
Fixed- telephony operators	1. Tajiktelecom (Gov't. of Tajikistan)
Mobile operators	1. Babilon Mobile 2. Tcell (TeliaSonera) 3. Megafon 4. Beeline/Tacom (VimpelCom)
Internet service providers	1. Babilon T 2. Tajiktelecom 3. Telecom Technology 4. Intercom 5. Saturn Online 6. Eastera 7. Tarena 8. MKF Networks 9. CompuWorld 10. KomCiTel
Fixed broadband technologies	ADSL, WiMax, FTTH
Mobile broadband standards	3G launched in 2005; WiMax launched in 2008; LTE launched in 2011
International internet bandwidth	2.5 Gbps

International internet bandwidth per capita	0.313 Kbps
Policy maker	Communication Service under the Government of the Republic of Tajikistan
Regulatory authority	Communication Service under the Government of the Republic of Tajikistan

The density of fixed phones is 5.24 units per 100 inhabitants and the number of subscribers is about 440,000. At the same time, the access to fixed telephone network of the population is not homogeneous. Fixed phones in the rural areas were around 50,000 in 2010 and in urban areas – 350,000.

The main operator of the fixed telephony in Tajikistan is the open joint-stock company "Tajiktelecom". Its network covers the whole country and provides a full range of fixed-line services. Tajiktelecom's fixed-line network was digitized and upgraded due to the EUR14 million financed by the European Bank for Reconstruction and Development in 2001. Over 95% of all its telephone exchanges across the country are digitized and most of its backbone lines are upgraded to fiber-optic cable. Alternatively there are many operators holding licenses for providing fixed-telephony services.

Mobile communication services is the most significant segment of the telecommunications sector - and remains highly stable and still growing by around 10% per year. At the end of 2014 the number of mobile phone users reached 95.13% of population with 7.99 million subscribers of mobile communication services. There are 9 mobile communication operators, out of which 4 (Babilon-Mobile, Tcell (a subsidiary of TeliaSonera), MegaFon, and Beeline/Tacom) provide services in GSM, 3G and 3.5G standards, while the other 5 mobile communication operators (TK-Mobile, SkyTel, M. Telko, T-Mobile, and Telecom Technology Ltd) provide services in CDMA 20001X, CDMA 450 standards. Four companies deployed 4G (WiMAX) networks and in 2008 began to provide these services. In 2012 Babilon-Mobile began to offer 4G LTE services. Over 90% of inhabited territory of Tajikistan is covered by cellular communication networks.

As of 1st of January 2015 the number of active Internet users in Tajikistan has reached 17.49 % of population. Tajikistan's Internet market is competitive, with at least ten Internet service providers in operation. In 2012 and 2014 fixed-broadband subscribers were 5,400 and 6,100 respectively that is around 0.07 % of the population, which demonstrate that this market is in stagnation, Babilon- T and Tajiktelecom are the broadband market leaders. The connection of users to fixed-broadband is made mostly via ADSL and fiber-to-the-building networks operated by Babilon-T and Tajiktelecom in Dushanbe and Khujand. Although at the moment the mobile broadband market is not extensive and there are only 50,000 mobile broadband subscribers, which represent 0.625 % of the population, the introduction of innovative technologies like WiMax and LTE are designed to prepare the infrastructure for developing this market. There are around 130 public Internet access points in the country.

Turkey	2014
Region	Western Asia
Surface area (square kilometers)	783562
Population	75,932,348
Population density in 2014 (per square kilometers)	99
Population growth rate (average annual %)	1.2
Urban population (%)	73
GDP: Gross domestic product (million current US$)	798,429
GDP per capita (current US$)	10,515.0
GDP growth rate (%)	2.9
Human Development Index (HDI), HDI ranking	0.761, 72
Literacy rate (%)	94.9
ICT Development Index (IDI), IDI ranking 2015	5.58, 69
E-Government Development Index (EGDI), EGDI ranking	0.5443/ High, 71
Fixed - telephony subscriptions (per 100 inhabitants)	15.1% (3rd Quarter 2015)
Mobile-cellular subscriptions (per 100 inhabitants)	94.26% (3rd Quarter 2015)
Individuals using the Internet (%)	51.04
Fixed broadband subscriptions	9,189,833 subscribers (3rd Quarter 2015)
Fixed- telephony operators	1. Türk Telekom (including TTNet) 2. Turkcell Superonline (Turkcell) 3. Turknet 4. İşNet 5. Millenicom 6. Vodafone Turkey 7. TTM Telekom 8. Net GSM 9. other service providers
Mobile operators	1. Turkcell 2. Vodafone Turkey 3. Avea (Turk Telekom)
Internet service providers	1. TTNet (subsidiary of Türk Telekom)) 2. Turkcell Superonline (subsidiary of Turkcell) 3. Doğan TV Digital 4. Millenicom 5. Turknet 6. Vodafone Net (subsidiary of VodafoneTurkey)
Fixed broadband technologies	ADSL, FTTB, cable , fixed wireless

Mobile broadband standards	3G launched in 2009; IMT-Advanced services will be launched in April 2016
International internet bandwidth	4.03 Tbps (3rd Quarter 2015)
International internet bandwidth per capita	51.5 Kbps (3rd Quarter 2015)
Policy maker	Ministry of Transport Maritime Affairs and Communications
Regulatory authority	Information and Communication Technologies Authority (ICTA)

As of the 3rd Quarter of 2015, the fixed-telephone penetration rate constituted 15.1% with 11,696,067 subscribers. In 2010 the fixed-telephony market share of incumbent Turk Telekom was 91.6%. Between 2010 - 2014 its market share decreased by 5.5% and in 2014 was 86.1%. Competitors include Superonline, Turknet, Is Net, Millenicom and Vodafone Net.

The mobile-cellular market counted 73,235,783 subscribers in the 3rd Quarter of 2015 that represented a penetration rate of 94.26%. The mobile market is served by three operators. In Q3 of 2015 according to subscriber numbers the Turkcell's market share was 46.8%, Vodafone's - 30.1% and the share of Turk Telekom's mobile subsidiary Avea - 23.4 %.

In April 2015 the household access to the Internet was 55.9%. At the end of September 2015 Turk Telecom's TTNet Subsidiary had 68.51% share of the Internet market, Superonline had 15.92%, the cable TV operator Turksat had 6.5% and an additional four ISPs each had market shares between 1 and 5%.

The fixed broadband penetration rate represented 11.9% which constitutes 9,189,833 fixed broadband subscriptions as of September 2015 with an increase of 323,472 subscribers compared to 2014. Around three-fourths or 75% were DSL. Fibre (FTTx) grew from 2010 (2%) and reached 17.4% at the end of September 2015. Turkcell Superonline offers a 1 Gbps FTTH service in 38 cities out of 81 in the country. Cable modem subscribership has some slight increase in the subscription and coverage rate. Its market share is approximately 6.5% of the fixed broadband market.

On the mobile broadband market there were a total of 25.9 million handset-based 3G mobile Internet subscribers in Turkey as of the 3rd Quarter of 2015, plus an additional 1.7 million 3G mobile computer-based users. Besides, mobile operators will launch IMT-Advanced services as of April 2016.

Turkmenistan	2014
Region	Central Asia
Surface area (square kilometers)	488100
Population	5,307,188
Population density in 2014 (per square kilometers)	11
Population growth rate (average annual %)	1.3
Urban population (%)	50
GDP: Gross domestic product (million current US$)	47,932
GDP per capita (current US$)	9,031.5
GDP growth rate (%)	10.3
Human Development Index (HDI), HDI ranking	0.688, 109
Literacy rate (%)	99.6
ICT Development Index (IDI), IDI ranking 2015	No data
E-Government Development Index (EGDI), EGDI ranking	0.3511/ Middle, 128
Fixed - telephony subscriptions (per 100 inhabitants)	11.77
Mobile-cellular subscriptions (per 100 inhabitants)	135.78
Individuals using the Internet (%)	12.20
Broadband subscriptions	2,300
Fixed- telephony operators	1. Turkmentelecom (Gov't. of Turkmenistan)
Mobile operators	1. MTS 2. TM Cell/Altyn Asyr (Gov't. of Turkmenistan)
Internet service providers	1. Turkmenistan Online (Turkmentelecom) (Gov't. of Turkmenistan)
Fixed broadband technologies	ADSL
Mobile broadband standards	3G launched in Ashgabat in late- 2010; 4G LTE launched in 2013
International internet bandwidth	650 Mbps
International internet bandwidth per capita	0.125 Kbps
Policy maker	Ministry of Communications, under the Cabinet of Ministers
Regulatory authority	Ministry of Communications, under the Cabinet of Ministers

At the end of 2014 the density of fixed phones was 11.77 units per 100 inhabitants with 624,400 subscribers. Turkmentelecom has a monopoly in the fixed telephony market.

At the end of 2014 the number of mobile phone users reached 135.78% of population with 7.2 million subscribers of mobile communication services. Altyn Asyr was the only mobile operator present in the market following the license revocation of the private mobile operator, MTS, in 2010. In 2012 MTS renegotiated its license and its market share was one-third as of year-end 2012. Altyn Asyr, which provides mobile service under the TM Cell brand name, was founded as a subsidiary of Turkmentelecom in 2004 and began operations the following year.

All private ISPs had their licenses revoked in 2000 and Turkmentelecom remains the only fixed-line ISP, via its subsidiary Turkmenistan Online. Access to the Internet was severely restricted until 2008, and MTS became the only competitor to Turkmentelecom when the mobile operator MTS began to provide GPRS/EDGE mobile Internet. At the end of 2014 there were 2,300 fixed broadband subscribers, which is 0.04% of population. The connection of the end users to fixed broadband services is made by ADSL technology. Mobile broadband: 3G was launched in Ashgabat in late-2010 by both Altyn Asyr and MTS Turkmenistan; 4G LTE was launched in September of 2013 by Altyn Asyr.

Uzbekistan	2014
Region	Central Asia
Surface area (square kilometers)	447400
Population	30,757,700
Population density in 2014 (per square kilometers)	72
Population growth rate (average annual %)	1.7
Urban population (%)	36
GDP: Gross domestic product (million current US$)	62,644
GDP per capita (current US$)	2,036.7
GDP growth rate (%)	8.1
Human Development Index (HDI), HDI ranking	0.675, 114
Literacy rate (%)	99.7
ICT Development Index (IDI), IDI ranking 2015	No data
E-Government Development Index (EGDI), EGDI ranking	0.4695/ Middle, 100
Fixed - telephony subscriptions (per 100 inhabitants)	8.55
Mobile-cellular subscriptions (per 100 inhabitants)	73.79
Individuals using the Internet (%)	43.55
Broadband subscriptions	389,000
Fixed- telephony operators	1. Uztelecom (Uzbektelecom) (Gov't. of Uzbekistan) 2. Buzton (VimpelCom) 3. East Telecom (Korea Telecom)
Mobile operators	1. Unitel (VimpelCom) 2. Ucell (TeliaSonera) 3. Uzmobile (Uzbektelecom) (Gov't. of Uzbekistan) 4. Perfectum Mobile (Rubicon Wireless Communication)
Internet service providers	1. Uznet (Uzbektelecom) (Gov't. of Uzbekistan) 2. Buzton (VimpelCom) 3. East Telecom (Korea Telecom) 4. Sarkor Telecom 5. Sharq Telecom 6. EVO 7. TPS
Fixed broadband technologies	ADSL, FTTB, WiFi
Mobile broadband standards	3G launched in 2007; LTE launched in 2010
International internet bandwidth	7.8 Gbps
International internet bandwidth per	0.259 Kbps

capita	
Policy maker	Ministry of Development of Information Technologies and Communications
Regulatory authority	Ministry of Development of Information Technologies and Communications

The incumbent state-owned operator Uzbektelecom operates three major subsidiaries: fixed telephony operator Uztelecom, mobile operator Uzmobile, and ISP Uzonline. Uzbektelecom maintains exclusive right over the country's international gateway infrastructure. Since 2004 several attempts to privatize Uzbektelecom were made by the Government that proved to be unsuccessful.

Uztelecom, a subsidiary of the incumbent state-owned Uzbektelecom, is the fixed telephony market leader and provides services nationwide. Other service providers on this market are Buzton and East Telecom, offering services especially to business customers.

At the end of 2014 the density of fixed phones was 8.55 units per 100 inhabitants with 2,507,711 subscribers. Fixed-telephony market growth in Uzbekistan, although positive, has been very modest over recent years of about 1.6 %. In the regional centers and towns 100% of exchanges are digital.

As of year-end 2012, Unitel was the country's largest mobile operator, with a 51% share; Ucell was close behind with 48%, and CDMA operators. UzbekMobile and Perfectum Mobile had shares of approximately 2% and 1%, respectively. On December 2008, Unitel was the first in Uzbekistan to announce the commercial launch of 3G network. LTE was launched in 2010. MTS -Uzbekistan, entered to mobile market in 2004 and in 2012 its license was revoked because of regulatory violations by the company. MTS re-entered the market in December 2014 in a joint venture with the Uzbek government. The return of MTS increased competition on the mobile and mobile broadband market.

Recent growth in Internet usage has been considerable; user penetration was 43.55 % in 2014 and has grown by 5.3% compared with the previous year. Uzbektelecom is the country's Internet backbone operator, and its subsidiary Uzonline provides access to Internet through its DSL and FTTH networks. In addition to Uzonline, fixed Internet service is provided by Buzton, East Telecom, Sarkor Telecom, Sharq Telecom, EVO, and TPS.

Fixed broadband subscriber penetration was still below 2% in 2014 with 389,000 fixed broadband subscribers.

Uzonline offers fixed broadband services using DSL and FTTH technologies and added a total of 120,000 new broadband ports in 2013 and number of ports installed to provide fixed broadband access to the Internet has been brought to 640 thousand to the end of 2014.

Uzbektelecom was continuing to roll out fiber-based Internet access in 2015 but the number of fiber-based broadband subscribers remained small. Buzton served more than 16,000 ADSL ports and 1,200 buildings via its fiber- to- the- building (FTTB) network, including over 200 kilometers of fiber deployment in FTTB networks in the cities of Tashkent, Samarkand, Bukhara, Zarafshan and Uchkuduk.

By contrast, mobile broadband had reached an estimated penetration of 24% by end-2014; 3G was launched in 2007. MTS-Uzbekistan launched the country's first 4G LTE network in July 2010 and initially limited to Tashkent. Ucell activated 4G network the following month and Unitel developed its LTE network in 2012.

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