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Mongolia

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Total population	2,646,000 (2006)
GDP per capita	USD 1,093 (USD 1 = MNT 1,165 as of March 2007)
Key economic sectors	Agriculture, Mining, Animal Husbandry, Animal Production and Processing (Meat, Milk, Cashmere, Wool), Tourism
Computers per 100 inhabitants	5
Fixed-line telephones per 100 inhabitants	6
Mobile phone subscribers per 100 inhabitants	33
Internet users per 100 inhabitants	0.42
Domain names registered under .mn	1,887
Broadband subscribers per 100 inhabitants	0.21

Overview

Since 2005, the information and communication technology (ICT) sector in Mongolia has developed with the support of a favourable policy and regulatory framework, institutional setup, and commitment from private software, hardware and infrastructure development companies extending ICT services to citizens.

The establishment of the Information and Communication Technology Authority (ICTA) under the direct supervision of the Prime Minister of Mongolia spurred ICT development, beginning with the development and implementation of the e-Mongolia national programme, changes to the legal and regulatory framework for ICT, and cooperation and coordination with companies and local and international organizations and donors, such as the World Bank, Asian Development Bank (ADB), United States Agency for International Development (USAID) and the International Development Research Centre (IDRC) of Canada.

ICT infrastructure has changed with the decision of the Government of Mongolia to separate services from networks. The Mongolian Telecom Company (MTC) has been divided into two companies: the service provider (ServCo) and the network maintenance company (NetCo). ServCo is mandated to provide services over the telecommunications network on the same terms as other service providers while NetCo is tasked with managing the telecommunications network backbone. This has opened up opportunities for service companies to use the network infrastructure on a competitive basis.

Two more mobile operators have commenced operations. The Unitel Company started providing services in June 2006 using GSM 1800 technology. G-Mobile has been awarded a license to provide ICT services in rural areas.

The software development companies have redirected their targets towards introducing and implementing software outsourcing. The hardware companies have set up the Mongolian Association of Computer Suppliers' Companies (MASCO). The ISPs have formed the Mongolian Association of Internet Service Providers (MISPA) to protect the rights of ISPs and to collaborate on addressing issues common to service providers, such as cost of bandwidth and outreach to the rural areas.

Nevertheless, there remain big challenges for the ICT sector in Mongolia. First, the draft laws on ICT are still under discussion. Second, there is a need to integrate ICT with public sector reform. Third, the ICT capabilities of the country's human resources need to be strengthened through curriculum change at the secondary and tertiary education levels. Fourth, there is a significant digital divide between the rural and urban populations. Although majority of the population lives in the rural areas, ICT penetration in rural areas is much lower than in urban areas. For example, the 7,726 rural users of fixed-line telephones represent only 6.4 per cent of the total users of telecommunications services (ICTA 2006) and 86 per cent of ICT businesses are concentrated in the major cities of Ulaanbaatar, Darkhan and Erdenet.

Technology infrastructure

The base line of the Mongolian telecommunications network consists of about 5,200 km of digital system radio relay line,

over 7,400 km of fibre optic network, around 27,000 km of air lines connecting *aimag*[1] centres with *soum*[2] centres, 23 VSAT stations with 10 Mbps of bandwidth and international Intelsat satellite stations providing services to over 332 communication stations with a capacity of 135.2 thousand telephones.

There are 342 telecommunications branches nationwide. Of these, urban telecommunications branches have 272 small-capacity telephone stations, 210 branches have radio connections and all branches are able to receive national TV broadcasting. There are 313 communication lines between *aimags* and *soums*, and 288 communication lines between *soums* and *baghs*[3]; 120 *soums* are connected to the central energy system and 105 operate using a solar energy source.

The fibre optic network has been deployed since 2000. It was recently extended to reach over 5,000 km in length, covering north to south along the railway, the South Gobi close to the mining areas, the east from Ulaanbaatar to Dornod, the farthest eastern *aimag*, the northwest from Khuvsugul *aimag* through to Zavkhan *aimag* and Uvs *aimag*, and all the way to the westernmost *aimag*, Bayan-Ulgii.

Five companies provide telecommunications services: Mongolia Telecom, Railcom, Incomnet, Mobicom and Skytel. There are two fixed-line telephone service companies: Mongolia Telecom and Mongolian Railway Authority. There are three mobile telephone operators providing services in all *aimag* centres and 62 *soums*. There are over 774,900 mobile phone users, which means that one in four citizens has a mobile phone.

There are five companies providing VSAT services: MTC, Civil Aviation Authority, Incomnet, Orbitnet and the Meteorology Office of the Ministry of Environment.

Wireless Local Loop (WLL) services were introduced in Mongolia in 1999. Five companies have licenses to operate WLL services: two are licensed to operate in Ulaanbaatar and the rest are obliged to cover rural Mongolia. Currently, they provide services in over 25 locations. As of the end of 2006, there are over 44,200 users of WLL services in Mongolia.

There are 14 ISPs, the majority providing services in Ulaanbaatar. Internet connections include dial-up, ADSL, leased line, Wi-Fi, CATV modem, fibre optic link and VSAT. The major service is through ADSL and dial-up connections.

Key institutions dealing with ICTs

The major institutions dealing with ICT are the Information and Communication Technology Authority (ICTA) and the Communications Regulatory Commission (CRC).

ICTA was established in November 2004 under the Office of the Prime Minister of Mongolia. Its primary responsibilities are to coordinate ICT policy, coordinate and implement ICT-related programmes and projects, and cooperate with national, international and donor organizations.

CRC, which was established in 2004 as an independent institution, handles the regulatory aspects of ICT. Its objective is to establish fair and effective competitive conditions in the IT market and to ensure the provision of high-quality services through the most advanced technologies. It issues licenses and permits, regulates tariffs, sets regulatory service fees, allocates radio frequencies and presides over the settlement of disputes.

In addition, the National Information Technology Park was set up with support from the Government of Korea to provide incubator services for newly established software development companies.

A number of NGOs are also active in the ICT sector of Mongolia. The list is headed by the Mongolian Information Development Association/Mongolian Information Technology Association (MIDAS/MONITA), which was established in 2001 as part of a joint project of the United Nations Development Programme (UNDP) and the Mongolian Foundation for Open Society (Soros Foundation) (MFOS). MIDAS/MONITA has actively promoted ICT in Mongolia through software and hardware exhibitions and projects undertaken with UNDP, the World Bank and other donor organizations. Two other ICT-focused NGOs were established more recently—the Mongolian Association of Computer Suppliers' Companies (MASCO) and the Mongolian Internet Service Providers' Association (MISPA).

The Japan-Mongolian Information Technology Association (JMITA), established in 2002, has been actively engaged in introducing Japanese software engineering examinations for Mongolians since 2005. The second round of training started in September 2006 and will be followed by the first round of examinations to be held in Mongolia. It is hoped that Mongolian software developers will gain the qualifications required by the Japanese software development industry, which would enable software development companies in Mongolia to do outsourcing jobs from Japan.

The Mongolia Development Gateway (MnDG) was established in 2002 with support from the Development Gateway Foundation to harness the use of ICT in sustainable development and poverty reduction activities and strengthen partnerships for development in Mongolia. At present MnDG runs an ICT basic skills training centre and a portal site (www.gateway.mn).

The software development companies have formed the Mongolian Software Industry Association (MOSA) with the aim

of protecting their legal rights and of transforming the software industry into one of Mongolia's leading industries with the capacity to penetrate the international market.

Digital content initiatives

The number of websites developed and maintained in the Mongolian language is growing, compared to 3–5 years ago when extensive attempts were taken to support the development of Mongolian-language websites. According to a study conducted by Intec, there are over 2,000 such websites which are hosted either in Mongolia or in other countries. Of these, 62.9 per cent use the .mn domain name, 20.6 per cent use .com, and 16.5 per cent use other domain names, such as .net, .org and .tk. It was observed that 23 per cent regularly update their website contents and 70 per cent have a dynamic structure. Of all websites, 62 per cent are in the Mongolian language and 36 per cent are in two languages (mostly English and Mongolian). Around 50.4 per cent belong to private companies, 12.1 per cent have education and discovery-related content, 11.6 per cent are websites of state and government organizations, 11.2 per cent are information and news websites, and the rest are NGO and personal websites.

The popular websites are information websites such as www.olloo.mn and www.mongolmedia.com, public discussion websites such as www.open-government.mn and www.forum.mn and portal sites such as www.pmis.gov.mn and www.gateway.mn.

The development of local language content in CD-ROMs has also been growing lately. There are learning materials like the e-learning CD-ROM package of the Microsoft Office Suite in the Mongolian language. The 'Innovating ICT for Rural Education of Mongolia' project of the ADB, Ministry of Education, Culture and Science (MOECS), and the Japanese Fund for Information and Communications Technology (JFICT) has supported the development of CD-ROM-based materials for teachers as tools for integrating ICT in teaching practices. Eleven CD-ROMs on using ICT in teaching English, Mathematics, Physics, Chemistry, Biology, Labour, History and other subjects have been developed by teams of software and applications developers and teachers and educators. The CD-ROMs, which are all in the Mongolian language, have been distributed to all of the 600 schools in Mongolia to be used by teachers in the classroom.

Online services

Online services are offered mostly by banks. The Golomt Bank and the Trade and Development Bank of Mongolia have websites through which citizens and individuals can check account balances, transfer money and conduct other online transactions.

One of the thrusts of the e-Mongolia programme is to encourage organizations to develop their own websites and to encourage governmental organizations to make information for the public available via their websites. The websites of the Mongolian Taxation Authority (MTA) and the Ulaanbaatar Mayor's Office are examples of openness and transparency. The MTA website contains an extensive array of information, laws and regulations related to taxes, and over 50 downloadable taxation forms commonly used by businesses and individuals. The website of the Ulaanbaatar Mayor's Office contains all of the orders and decrees issued by the Mayor of Ulaanbaatar City.

In contrast, few businesses in Mongolia are introducing online services. The following provide e-commerce services: www.rose.mn, www.asuult.net, www.banjig.net and www.call2mongolia.com. The first online insurance system in Mongolia was introduced by Practical Daatgal Co. Ltd. (www.practical.mn).

In addition, online distance diagnosis and training services for the rural population are now available through the project 'ICTs for Health Services in Rural Mongolia' implemented at the Health Sciences University of Mongolia (HSUM) and supported by IDRC in 2003–05. The 'Doctor system' (www.pi-hsum.mn/dd/) for distance diagnosis works even with low bandwidth. At present, it is used to transmit patient information from remote areas to the capital city for diagnosis and treatment advice. An e-learning system for medical professionals who live and work in the rural areas is also part of the project. This system (www.pi-hsum.mn/de/) allows users to take online courses, quizzes and a final examination. If they qualify, they receive a credit certificate issued by the Postgraduate Institute of HSUM. It is also possible to take paid courses by using a prepaid scratch card.

ICT and ICT-related industries

The number of mobile service providers has increased with Unitel Company starting operations in June 2006. Unitel offers GSM 1800 technology-based services, mainly in the Ulaanbaatar metropolitan area. A fourth operator, G-Mobile, has been awarded a license to provide mobile services based on GSM 450 technology to rural parts of Mongolia. G-mobile is expected to provide services to 125 *soums* initially and then to an additional 80 *soums* within two years.

Outsourcing is a new ICT industry in Mongolia. Several software development companies have been providing outsourcing services for other companies in Mongolia and in developed

countries, such as Japan, the USA and the UK. In this connection, the Mongolian government has redirected the support provided by the National IT Park to companies that are able to provide support to outsourcing bridge companies. Currently, there are about half-a-dozen companies developing software and applications for Japanese and Mongolian companies with staff working in Japan.

In addition, wireless technologies have been penetrating the Mongolian market, with several companies offering wireless solutions. Following the trend, ICTA has set up four free access hotspots in Ulaanbaatar—at the airport, railway station, National IT Park building and Sukhbaatar Square. Hotels, restaurants and other businesses are integrating wireless applications in their businesses. This new trend finds support in the Last Mile Initiative (LMI) of USAID, which aims to pilot test Wi-Fi networks in the rural areas of Mongolia (*see the next section*).

Enabling policies and programmes

The e-Mongolia national programme developed by ICTA and approved by the Government of Mongolia has outlined 16 objectives which are indicated in a plan of action and which are being pursued through projects like 'Computers for All' through which Intel will provide quality computers at affordable prices to the citizens of Mongolia. Six months after the programme's implementation in July 2005, over 8,000 computers had been sold (ICTA 2006), which is a significantly higher number than the average monthly sales of computers without this project. Supplementing the Computers for All project is the effort to get ISPs to reduce the cost of Internet services and to lower telecommunications costs associated with access to the Internet. As a result, low-cost Internet options are now being offered to families and individuals, with telecommunications charges for dial-up connections drastically reduced from MNT 40 per minute to MNT 1 per minute. Moreover, as of November 2006 the Skytel Company, one of the VSAT service providers, has been offering ADSL services.

Legal and regulatory environment for ICTs

Following its establishment and the introduction of the e-Mongolia programme, one of the first activities carried out by ICTA was to develop proposals for a favourable legal and regulatory framework for ICT development in Mongolia. Aside from existing ICT-related laws, such as the Law on Telecommunications, Law on Radio Frequency and Law on Post, there are several laws and regulations that make reference to ICT. These include the Law on Education (approved in 2002), Law to Protect Intellectual Property, Law on Author's Rights, Patent Law, Law on Technology Transfer and Law on Science & Technology. Each of these laws contains clauses on the introduction and integration of ICT in the sector. For example, the Law on Education has a clause about reforming the curriculum of informatics subjects in the secondary school and developing a world-class curriculum for ICT specialists.

Although extensive work has been undertaken in drafting a general law on ICT and laws on e-government, digital signatures and e-commerce, they need to be revised in light of the latest developments in the ICT sector. The World Bank's Information and Communications Infrastructure Development Project has components to review the existing legal environment for

The last mile initiative

USAID's Last Mile Initiative (LMI) is a global programme to expand the rural poor's access to communications. Launched in April 2004, LMI intends to spur increases in productivity and transform the development prospects of farmers, small business, new start-ups, and other organizations in rural areas presently underserved by the world's major voice and data telecommunications networks. Six countries were selected to participate in LMI in its inaugural year. Fifteen additional countries were selected in 2005, Mongolia being one of them.

The goal of the Mongolia LMI Project is to install low-cost community-centric telecommunication services—primarily voice—in four *soum* centres as a way of providing those living in these rural communities with telephony access that would link them to the other cities in Mongolia and to the world. During the initial assessment, a Wi-Fi-based pilot project was suggested as the best means of connecting rural Mongolia in an effective and affordable way. The project carried out tests of Voice-over-Wireless Fidelity (VoWi-Fi) phone networks in rural Mongolia and developed a more detailed project plan. Advanced VoIP/Wi-Fi technologies are expected to deliver Internet-based telephony to rural communities at a substantially reduced cost compared to other technologies.

Currently, the LMI project is being piloted in Saikhan *soum* of Bulgan *aimag* and Tsengel *soum* of Bayan-Ulgii *aimag*.

the ICT sector and to provide recommendations to improve public–private partnerships for e-government. At the same time, the European Bank for Reconstruction and Development is funding the revision of the existing telecommunications law by the CRC. A working group composed of representatives of ICTA, the private sector and NGOs has been established to coordinate the efforts of various stakeholders and to develop a draft package law on ICT which would include a general IT law and draft laws on communications, e-government, digital signatures, e-transactions, information security and freedom of information.

Education and capacity building

The major state institutions offering ICT-related courses are the Computer Science and Management School (CSMS) of the Mongolian University of Science and Technology (MUST), the School of Mathematics and Computers of the National University of Mongolia (NUM), the School of Information Technology of NUM and the School of Computer Science and Technology of the Mongolian State University of Education (MSUE). There are also private ICT schools, such as the Khuree Institute and the Ulaanbaatar Institute.

Microsoft-certified and CISCO Academy training programmes have likewise been available in Mongolia in the last 3–6 years. The Intec Company recently introduced the Aptech Certified Computer Professionals Programme from Aptech, India. This initiative is expected to give Mongolians the opportunity to receive certified computer education from well-known and highly reputable providers in Southeast Asia.

The Asian Development Bank has been working extensively with the Ministry of Education, Culture and Science (MOECS) on the development of the education sector, with a focus on the development of ICT-related education. One of the components of the Second Education Development Programme (SEDP) is introducing ICT in secondary complex schools through provision of computers and hardware and basic computer skills training. In addition, technical assistance is being provided to introduce ICT in rural *soum* schools, including teacher training in computer and technology-related skills and in integrating ICT in the classroom.

Open source and open content initiatives

There is currently no government policy paper for open source software and open content-related activities. Not even the e-Mongolia programme mentions open source. However, members of the Mongolian ICT community appreciate the value of open source applications and content.

ICTA has launched, within the framework of the e-Mongolia programme, the 'Web and E-mail' sub-project which involves the customization and adoption of the Joomla open source content management system for government organizations. A recent InfoCon study shows that nine out of 15 ISPs use OSS in their operating, networking, Web serving, mail serving, or database serving systems (for example, Redhat, FreeBSD, BIND, Samba, Apache, Tomcat, MySql, PostgreSql, Sendmail and Mailman).

Two NGOs, OpenMN and the Mongolian UNIX Users Group (MUG), are advocating the promotion, utilization and development of open source software in Mongolia. OpenMN (www.openmn.org), which was founded in 2003, has released the Mongolian version of a UNIX-like operating system named Soyombo 1 as a modular distribution based on Morphix with live CD support (bootable and operable from a CD). At present, it is translating KDE and GNOME into the Mongolian language. MUG, which was established in 2004, successfully organized the first Mongolian Linux Festival and SysAdmin Summit in 2006.

Also in 2006, the Ministry of Education, Culture and Science developed the Mongolian e-library (www.elibrary.mn) to meet the information needs of Mongolians.

Other major sources for online open content in the Mongolian language are www.gateway.mn operated by MnDG, www.forum.mn by Open Society Forum NGO, and www.montsame.mn by the Mongolian National News Agency. The goal of the MnDG portal is to provide a variety of quality open and inclusive content. The portal system intends to link existing knowledge networks and bring together the best available information about development issues. The site uses a 'deferred publishing' approach, whereby content suggested by users is reviewed prior to publication on the site. The Open Society Forum is a new initiative of the Mongolian Foundation for Open Society. Its goal is to provide broad access to information resources about policies, laws and regulations and to provide a venue for public engagement in the policy formulation and implementation monitoring process. At present, it is focusing on three broad themes: Governance, Economic and Social Policies.

The Information Technology Thesaurus Project (http://www.itdic.edu.mn/term/) is an online dictionary designed by IT specialists and teachers to standardize the use of terminology in the IT sector. A team of editors has been appointed to produce a print version that will be made available to the public.

The Evaluation and Adaptation of OSS for Distance Learning in Asia project (http://www.infocon.mn/eng/index.php?inf=projects#9) aims to evaluate existing open source

distance learning software and identify suitable software that can be customized to meet specific needs of educational institutions in the Asian region. The project is supported by IDRC.

Research and development

In May 2006, the Information and Communications Infrastructure Development Project, a USD 10 million technical assistance package of the World Bank, was approved by the Government of Mongolia. The project has three major components: (a) universal access, (b) monitoring the radio spectrum and (c) e-government. The first component was first implemented in 2004, when the feasibility study was conducted among herders of three *soums* of Arkhangai and three *soums* of Bayankhongor *aimag*. The study showed that herders are willing to spend at least MNT 5,000 per month (about USD 4.29) for telephone services as long as the service will be provided in locations closer to them. Based on the study results, the universal access component of the project aims to provide telecom services in *soum* centres and *bagh* centres. Such services are now available in centres in Tariat, Undur-Ulaan and Khangai *soum* of the Arkhangai *aimag* and in at least 10 *bagh* centres in each of these *soums*. Mobicom and Incomnet are to provide the services. On the drawing board is a study of demand for telecommunications among herders in the eastern, western, northern and southern *aimag* to be undertaken in May 2007.

Also worth mentioning is the Naraa Foundation ICT4D Scholarship funded by IDRC. Awards are primarily for students of IT schools of government universities. Students from other faculties (such as health, agriculture and education) who are incorporating ICTs in their research are also eligible. At present about 30 students are receiving the scholarship. The project aims to establish an ICT4D scholarship fund to support Mongolian tertiary-level students who are completing their Bachelor and Master's degree courses in ICTs.

Challenges

First, more work is required for the further development of ICT-related laws and regulations in Mongolia. In light of the rapid changes in the ICT field worldwide, the draft laws on ICT, including the general law on ICT and the law on e-commerce, digital signatures and e-government, need to be reviewed and adjusted if necessary to take into account new developments such as those related to e-security. The draft laws must also be approved by the Mongolian Parliament.

Second, e-government needs to be developed. Initial steps in this direction are: introducing public servants to e-mail, using an internal filing system and integrating ICT in the everyday work of public administration officials.

The third major challenge is in the area of human resource development. There is a need to amend the curriculum of tertiary institutions and secondary schools, including the curriculum of ICT-related subjects, courses and degrees. The Aptech Centre in Mongolia is expected to play a significant role in integrating the latest ICT-related curriculum in the curriculum of tertiary institutions as well as in integrating ICT in the secondary schools.

Finally, the biggest challenge concerns the education and training of the general public, especially individuals who are not working in ICT fields. Education and training programmes in basic ICT literacy and in the use of ICT-related services such as online payments and online registration need to be organized. Equally necessary is the development of local content responding to the needs and demands of users, given that there are currently few online resources and services available to Mongolians.

Notes

1. An *aimag* is an administrative unit equivalent to a state or a province. An *aimag* consists of *soums* and *baghs*.
2. A *soum* is an administrative unit equivalent to a county. There are over 300 *soums* in Mongolia. Each *soum* consists of 3–5 *baghs*.
3. A *bagh* is the smallest administrative unit of Mongolia. There are over 1,500 *baghs* spread throughout Mongolia.

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