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# ICT ECONOMIC IMPACT ASSESSMENT

**FINAL DRAFT – NOT FOR PUBLICATION OR CIRCULATION**

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## ACRONYMS AND ABBREVIATIONS

Afs	Afghani (currency)
ANA	Afghan National Army
ANP	Afghan National Police
AWCC	Afghan Wireless Communication Company
AISA	Afghanistan Investment Support Agency
ATRA	Afghanistan Telecommunication Regulatory Authority
ARPU	Average Revenue Per User
BTS	Base Transceiver Station
BRT	Business Receipts Tax
CAPEX	Capital Expenditure
CSO	Central Statistical Office
CEO	Chief Executive Officer
CDMA	Code Division Multiple Access
DAIL	Directorate of Agriculture, Irrigation and Livestock
DCIT	Directorate of Communications and Information Technologies
DCN	District Communication Network
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
GPS	Global Positioning System
GSM	Global System for Mobile
GIRoA	Government of the Islamic Republic of Afghanistan
GCN	Government Communication Network
GDP	Gross Domestic Product
HR	Human Resources
ICT	Information and Communication Technologies
IT	Information technology
IVR	Interactive Voice Response
ISP	Internet Service Provider
LFSP	Local Fixed Service Provider
MB	Megabyte
MAIL	Ministry of Agriculture, Irrigation and Livestock
MTR	Mobile Termination Rate
MCIT	Ministry of Communication and Information Technology
MoE	Ministry of Education
MoF	Ministry of Finance
MoHE	Ministry of Higher Education
MoPH	Ministry of Public Health
MRRD	Ministry of Rehabilitation and Rural Development
MBB	Mobile Broadband
MNO	Mobile Network Operator
MMS	Multimedia Messaging Service
NICTAA	National Information Communication and Technology Alliance of Afghanistan
NISPAA	National Internet Service Provider Association of Afghanistan
NATO	North Atlantic Treaty Organization
OPEX	Operational expenses
OFC	Optical Fiber Cable
SMS	Short Message Service

SIM	Subscriber Identity Module
STM	Synchronous Transport Mode
TAT	Telecom Advisory Team
TDF	Telecommunications Development Fund
UAE	United Arab Emirates
USAID	United States Agency for International Development
VSAT	Very Small Aperture Terminal
VCN	Village Communication Network
WiMax	Worldwide Interoperability for Microwave Access



## EXECUTIVE SUMMARY

The ICT sector is one of few undeniable success stories in Afghanistan's development over the past 12 years. In 2002, telecommunications services were virtually non-existent, restricted to a very small number of fixed-line connections and satellite communications unaffordable to the general public. In 2014, four major GSM operators and two fixed-line and CDMA operators provide affordable access to telecommunications to 88% of the population, and about 3 million Afghans are connected to the Internet. This has been achieved thanks to commitments of national and international investors as well as good public and private governance of the sector.

The purpose of this assessment is to estimate more precisely the extent to which information and communications technology (ICT) has contributed to economic growth and job creation since 2002, and to evaluate future growth until 2017.

The overall approach for the assessment was in three steps. First, a bottom-up model was built for the sector using data collected from various segments of the sector, to assess *direct* impact of the industry – direct impact being defined here as the total revenue and employment generated by ICT firms (either directly or through their providers). This model helped design growth scenarios based on a small number of assumptions. Second, econometric models were applied to aggregate macroeconomic data in order to estimate the wider *overall* impact of ICT on Afghan economy. This was the only way to obtain a numeric estimate of indirect impact (i.e., the impact of ICT on non-ICT firms) in terms of productivity gain. Third, qualitative insights were collected at the micro level, to build case studies that support the quantitative data but also to better conceptualize the extent to which ICT has impacted specific sectors, organizations, and individuals.

In October and November 2013, a team of seven consultants (three international and four national) completed a total of 137 interviews in 7 cities (Kabul, Herat, Mazar-e-Sharif, Kandahar, Jalalabad, Pul-e-Khumri, and Kunduz), the majority of which took place in Kabul (75). All of the research tools designed were qualitative. The questions were open-ended and based on background research conducted prior to each interview.

## STATE OF THE ICT SECTOR

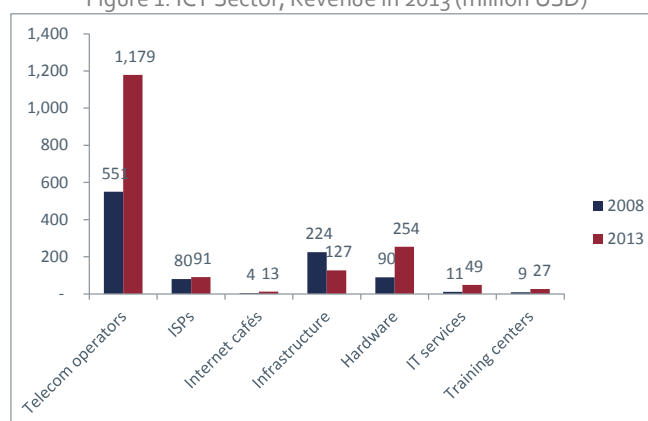
### KEY HIGHLIGHTS

- Estimated gross revenue generated in the ICT sector in 2013: \$1.81 billion
- Estimated contribution of the ICT sector to Afghanistan GDP in 2013: \$950 million
- Estimated total number of Afghans employed in the ICT sector in 2013: 138,500



To evaluate direct contribution of the ICT sector, individual contributions from subsectors were modelled: telecommunications operators, internet service providers (ISPs), installation of telecommunication infrastructure, hardware distributors, IT service providers, training centers, and internet cafes. The gross revenue generated in the ICT sector in 2013 is estimated to be \$1.81 billion<sup>1</sup>, the large majority of which stems from telecommunications (\$1.294 billion).

Figure 1: ICT Sector, Revenue in 2013 (million USD)

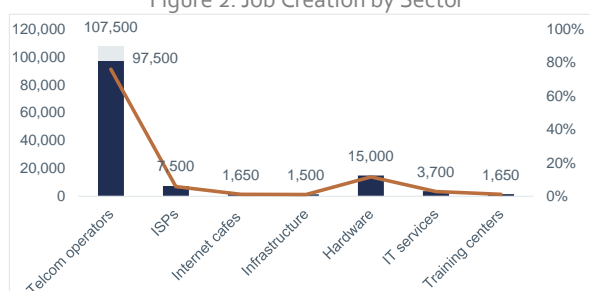


As shown in Figure 1, the revenues generated by all sectors but one have grown substantially since 2008, in particular the telecom operators sector doubled its revenue, which now exceeds \$1 billion per year. Telecommunication infrastructure is still important, but much less so than in 2008 when telecommunications operators were rapidly building their networks.

The ICT sector's direct contribution to Afghanistan GDP in 2013 is estimated to be \$947 million. The amount was calculated by removing intermediary costs not contributing to national GDP from revenue figures<sup>2</sup>. For the telecommunications sector, contribution to Afghanistan GDP is estimated to be \$707 million, nearly 3 times more than the rest of the industries combined (\$240 million).

In 2013, it is estimated that the ICT sector directly accounts<sup>3</sup> for 138,500 jobs for Afghans. The overwhelming majority of these come from direct and indirect employment via telecommunication operators (78%). Telecom is followed by hardware (11%), ISPs (5%), and IT services (3%). Employment in infrastructure, training centers, and internet cafes account for 1% each. Average salaries and levels of qualifications are higher for professional staff employed directly by telecommunications providers, but they represent only a small portion of the employment generated by these firms due to the large unskilled sales forces they utilize, discussed below. With the exception of this uniquely consumer oriented sales force, is likely that wage bills follow more or less the same pattern as employment figures.

Figure 2: Job Creation by Sector



Telecom is followed by hardware (11%), ISPs (5%), and IT services (3%). Employment in infrastructure, training centers, and internet cafes account for 1% each. Average salaries and levels of qualifications are higher for professional staff employed directly by telecommunications providers, but they represent only a small portion of the employment generated by these firms due to the large unskilled sales forces they utilize, discussed below. With the exception of this uniquely consumer oriented sales force, is likely that wage bills follow more or less the same pattern as employment figures.

It is estimated that the breakdown between skilled and unskilled positions is 20% skilled and 80% unskilled. The majority of unskilled positions stem from the telecommunications sector, in which tens of thousands of pre-paid mobile scratch card sellers are employed across the country.

<sup>1</sup> This represents the sum of revenues for all sub-sectors as shown in Figure 1. When expenses in infrastructure are removed (paid by telecommunication firms to infrastructure layout firms) as well as domestic interconnection costs (paid by telecommunication firms to each other), the net revenue is close to \$1.6 billion.

<sup>2</sup> GDP contributions calculated this way thus include the direct contribution to GDP to all ICT firms in the sector and their chain of providers.

<sup>3</sup> See below for employment generated by ICT in other sectors. Employees at MCIT, ATRA and other ICT-related government agencies are not counted in this figure.

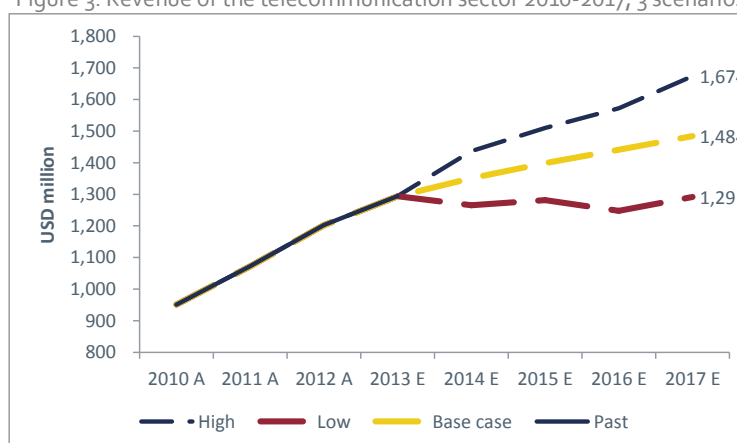
However, skilled positions are on the rise as key informants suggest more educated Afghans are now trained than in previous years to fill legal, technical, financial, operational, and administrative positions, among others.

The ICT sector is dominated by the telecommunications sector. As such, the future outlook of the ICT sector as a whole is largely dependent on several factors related to telecommunications. The large growth rate observed in the past ten years, largely induced by extension of the networks, is likely to slow down, as operators are less inclined to extend further extensions their networks to less profitable areas.

Demographic growth should provide the sector with a moderate structural growth rate.

An expected decrease in mobile termination rates (MTR) to a small extent, and more importantly the introduction of Afghan Telecom into the GSM and 3G market could decrease average revenue per user (ARPU) and have a significant negative impact on the sector's revenue.

Figure 3: Revenue of the telecommunication sector 2010-2017, 3 scenarios



However, the expected growth in the mobile broadband market might offset losses in voice service. Therefore, depending on the policy decisions implications and on the growth generated by mobile broadband, it is estimated that the revenue of the telecommunications sector by 2017 will stay at the 2013 level (low scenario), or increase by as much as \$380 million (high scenario) from a current \$1.29 billion. The latter scenario translates in terms of direct contribution of ICT sector to GDP into an increase \$196 million from a current estimate of \$707 million. Furthermore, the above estimates would therefore translate in a loss of 11,000 jobs (worst scenario) or a gain of 27,000 jobs (best scenario) by 2017.

## ECONOMETRIC MODELS

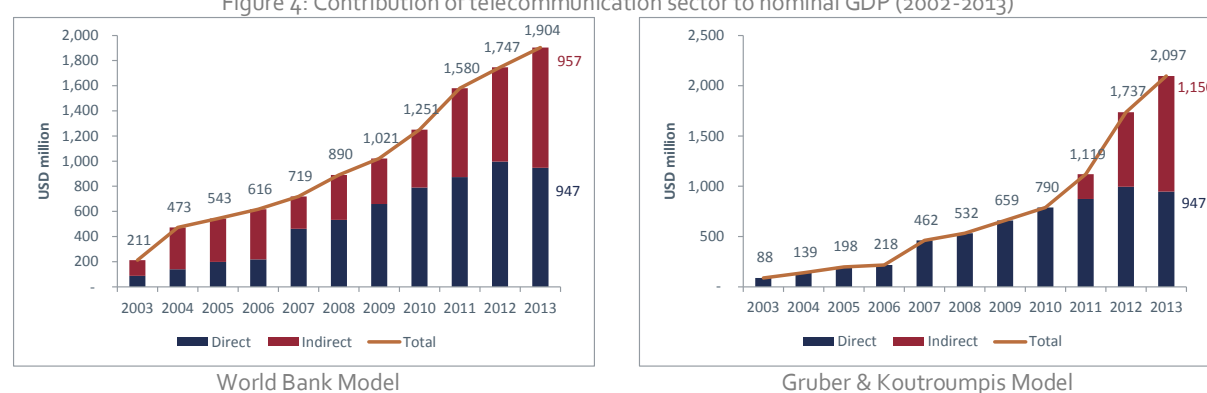
Two existing econometric models designed to measure the impact of ICT on economic growth were chosen for analysis in this assessment, given their use in developing countries and potential applicability to Afghanistan. One of the most cited models to determine the impact of ICT on national economies is the model built by a World Bank team (Qiang & Rossotto) in 2009. The model focuses on the economic impact of broadband and mobile phone penetration rates in a cross-country growth analysis, but does not account for reverse causation. A second, more elaborate model was therefore tested. Designed by H. Gruber and P. Koutroumpis in October 2010, this model assessed the impact of mobile telecommunications on growth by taking the latter as a determinant of the diffusion of mobile telecommunications, thus removing endogeneity. It differentiates low and high income countries and notices a time effect: contribution of the sector to GDP increases with time spent at high penetration rates.

The application of both models in Afghanistan does not yield a positive result, given the limited number of data points available: only 10 years of data are available. In both cases, the only possibility was to apply the models' results (coefficients) to Afghanistan.

The Qiang & Rossotto (World Bank) model (built from 1,125 observations from 192 countries, not including Afghanistan) finds an average 0.81 percentage points in real per capita GDP growth per 10% increase in mobile phone penetration in low- and medium-income countries. Applying this coefficient to Afghanistan suggests an average 5% contribution to growth rate of real GDP per capita between 2003 and 2013 (out of a total 9% average growth rate). As the model does not account for endogeneity, it is likely to overestimate contribution of the sector to GDP growth.

The Gruber and Koutroumpis model, removing endogeneity, suggests an average CAGR<sup>1</sup> contributed by the telecommunication sector to be between 0.25% and 0.29%. Combining the estimation results of the study with the mobile penetration in Afghanistan since 2003, this would mean that telecommunication sector contributed about 2.3% of the growth in real GDP. This is lower than figures found by the World Bank, as expected by the removal of reverse effect of GDP growth on telecommunication consumption. Further, the time effect is clearly visible (see Figure 4) in the later periods. Using this last estimate, the indirect contribution of the sector to GDP would be negligible until 2009, and gradually reaching twice the direct contribution in 2013.

Figure 4: Contribution of telecommunication sector to nominal GDP (2002-2013)



Following this estimate, the total contribution of ICT sector would thus represent about \$2 billion, or 9.7% of Afghanistan GDP in 2013.

## IMPACT OF ICT ON NON-ICT SECTORS

The above macroeconomic models suggest an indirect contribution of ICT sector to Afghan economy of \$1.2 to \$1.4 billion in 2013. This figure is impossible to reconstruct from the bottom up, but qualitative evidence was looked for in non-ICT sectors. Sectors were chosen based on likelihood of their usage of ICT, as well as the research team's understanding of the Afghan context. Sectors selected included banks, media, trade, logistics, transportation, construction, agriculture and industry. In addition, a number of government ministries and agencies were interviewed in seven provinces.

A major part of the indirect impact of ICT is to be found in some sectors which could not properly function without communication technologies (such as the banking sector), or have already become highly dependent on ICT. For example, aviation companies now have online purchasing systems and travel agencies are now in abundance thanks to the availability of systems that allow agents to connect to airline computer reservation systems. Research firms can use inexpensive mobile minutes to operate call centers, as opposed to costly and often dangerous in-person visits.

<sup>1</sup> Compound annual growth rate

More generally, a number of common impacts were found across all sectors and organizations, both public and private, large and small. Organizations that have invested in new technologies report an increase in staff and output productivity, rapid communication and coordination between offices and with clients, and ICT have allowed for the implementation of monitoring mechanisms from simple clock-in/clock-out systems to monitor staff working hours, to more sophisticated GPS tracking systems for logistics firms to monitor their trucks while in the field. Investment in new technologies has become more affordable for the average company with the steady decline of telecommunications and internet prices in Afghanistan over the past 10 years, therefore lowering OPEX for many companies. ICT has allowed for greater access to information such as through agricultural price data system providing farmers access to wholesale prices; opened the doors to new business opportunities for firms searching for new clients online; and has allowed for the development of management information systems (MIS) for public and private organizations to safely store and analyze important information. Furthermore, ICT has allowed for the introduction of e-government services, online training opportunities for staff members, and assisted to curb corruption via tracking of financial transactions.

However, the introduction of ICT has had a mixed impact on job creation. In essence, ICT has participated to the creation of new positions in companies, such as IT officers with technical tasks, but the adoption of new technologies has also resulted in reducing the size of administrative and financial departments, in some cases by up to 70%. This is a typical consequence of the shift to a computerized system in which procedures are automatized and fewer human resources are needed. Without a proper estimate of net effects on non-ICT sectors, it is impossible to evaluate the net effect ICT has had on Afghan jobs, but it is very likely positive, as even in the worst case scenario where ICT would have a negative effect on employment in non-ICT sector, it is very unlikely it would be of the scale of job creation within the ICT sector.

A number of obstacles exist for the larger impact of ICT on non-ICT sectors. Illiteracy, a lack of online content available in local languages, a lack of basic knowledge in computer science, the absence of adequate infrastructure such as constant electrification, poor customer service, high prices of internet and telecommunications services and for some an organizational reluctance to change were identified as primary challenges.

Despite obstacles, it is expected that ICT will have a positive impact on non-ICT sectors in the near-term. First, as infrastructure continues to be built and as competition grows, prices of telecommunications and internet services are likely to further decrease. Second, with more and better quality infrastructure, companies will have the ability to operate in more areas of the country. 3G seems to be positioned to play a strategic role, providing cheap and mobile internet access. Third, IT companies will continue to pursue their development, and will be supported by a better-trained workforce. Young entrepreneurs are likely to produce more software, mobile applications, and database systems tailored to Afghan companies' needs. These IT services and products should further enhance the productivity of local firms, reducing the time needed for administrative and financial tasks, along with improving management. It should also increase the quality of their work, opening the path to strengthened project monitoring.

Finally, on the government side, public services will complete the establishment of e-government services. They will guarantee more efficient service delivery, which will contribute to more legitimate institutions.

## CONCLUSIONS

Figures highlighted in this report show indeed that the ICT sector has been an important driver for the growth of Afghan economy and employment: it contributes directly to GDP at a very significant level; its influence is already visible in many non-ICT sectors; and the spillover effects will certainly grow stronger with time. The rapid growth of the sector has closely followed the gradual extension of service coverage, at least for phone service.

An important enabling factor of growth has been a good governance of the sector, which from fairly unregulated, in order to promote rapid equipment in infrastructure, evolved to a more regulated environment meant to promote wider access to the poorest through more intense competition.

## FUTURE PERSPECTIVES

It is however likely that this last period of intense growth is coming to a term. This report witnesses a turning point at which the telecommunication sector becomes more mature, nearly reaching saturation (at least to the extent of coverage that private investors are willing to fund) and prices are driven down by competition.

While there are still resources of growth, particularly in the development of mobile broadband, it is very likely that growth will go at a slower pace in the near future than in the past years. Smaller profit margin and more competition in the telephony sector will mean a more fragile equilibrium, and therefore that particular attention should be placed on regulation and sector governance, so that existing operators are not driven to stop their activities.

Similarly, the Internet sector is also undergoing a transition from a high-profit, low volume B2B market to a higher volume B2C market with smaller profit margins. Attention of the regulator is required to make that Afghan Telecom's position in the sector does not create potential risks.

As a whole, it is expected that the direct contribution of the sector to Afghanistan GDP will stay significant, but might not be as important as in the past years. Studies suggest however that the indirect benefits of the sector increase with time: the overall contribution of the sector to GDP might be more driven by its indirect impact than by the sector revenue.

These effects however are constrained by other factors, such as literacy (for internet access), per capita income growth, the sophistication of the banking sector (for online payment) and the financial sector (to invest in technological ideas), and more generally the economic capacity of the domestic market. On the long term (beyond 2017), the sector will probably be less of a driver, and more dependent on the development of the Afghan economy as a whole, before it can start being a driver again.

## POLICY RECOMMENDATIONS

### Securing critical infrastructure

The sector has reached a stage at which the attention of policymakers can be gradually shifted from enabling infrastructure building to securing existing infrastructure. For a more digitized economy to develop, the telecommunication infrastructure must be performing efficiently and reliable. Sustained investment in the national OFC backbone network and related infrastructure is still needed, but there is also a need for a large effort in capacity building and organizational activities to guarantee that this infrastructure is properly managed, maintained, protected and used in the most efficient manner.

## Reforming Afghan Telecom

One of the most contentious points in the development of ICT sector in Afghanistan is the role of Afghan Telecom. As a state-owned company, there is a fear that it can benefit from uncompetitive advantages. Its introduction as a GSM/3G operator is surprising to most external observers: in other countries, developed or developing, the introduction of a fifth national operator has nearly never been successful, and it is doubtful that in a country such as Afghanistan with a relatively small population and an already saturated landscape, this endeavor could succeed in a purely competitive environment, without being given unfair advantages. Afghan Telecom is also the sole operator of the national OFC network. This also creates a potential privileged position in offering the mobile broadband services that the Open Access Policy seems insufficient to fully prevent absent vigilant oversight by the regulator, ATRA .

The problem is further complicated by the stated willingness of the Government to privatize Afghan Telecom. A future Government might plan to sell at the best price a well-established state-owned telecommunication company with a monopolistic access to critical internet infrastructure (and to a lesser degree, landlines), and a significant market share in both the ISP and the GSM/3G sectors. Unless great attention is given to the issue, consequences of this perspective are very likely to interfere with both fair competition and incumbents willingness to further invest in the country.

To solve some of these issues, consideration might be given to splitting Afghan Telecom into several entities corresponding to its current activities: a low-level network infrastructure operator, in charge of the national OFC network and given a central role in incident response; an ISP, given Afghan Telecom's current internet retail and low-scale wholesale activities; and a mobile network operator. These activities should at least be functionally and financially separated within Afghan Telecom as a good management practice, and as it will facilitate oversight by the regulator.

Moreover, Afghan Telecom seems to currently lack the capacity to operate efficiently on all these segments of the market. A large effort of restructuration, in human resources and capacity building is needed.

## Building capacity and promoting the independence of ATRA

The role of ATRA in the near future will be critical in regulating the sector in the fairest way possible. The particular situation of Afghan Telecom will present a large challenge, and unless ATRA is sufficiently independent from those responsible for the viability of the state-owned company , it is highly possible that its decisions will be biased by political influences.

ATRA will also need to have a high-level capacity to fulfill its role. There is no doubt that in the past 12 years, ATRA has succeeded in securing the necessary foreign assistance to do so, but its internal capacity is still considered weak by experts. ATRA has effectively lacks capacity to acquire and process data needed to identify problems, or to enforce many of its decisions. For example, if the current spectrum assignment is considered good enough by MNOs to satisfy their future needs, but MNOs complain about interference issues. ATRA does not have the technical capacity to probably confirm the claims and diagnose the sources of the problem or to force offenders to comply with regulations.

Therefore, there is an immediate need to build technical and management capacity at ATRA, and to pave the way towards complete autonomy (in terms of capacity) and political independence from those who make policy for Afghan Telecom.

## Promoting digital economy through Government projects



The Ministry should work together with other ministries and government institutions to actively prepare the ground towards a more pervasive digital economy.

As shown in this report, usage of IT and Internet is slowly starting, and roadblocks are numerous: literacy rate, education on basic IT, high quality specialized training are challenges that have to be addressed in a concerted effort with ministries of Education and Higher Education. The largest part of the ICT workforce is essentially trained on the job by the private sector, but it is expected that as IT becomes more prevalent, human resource needs will grow stronger and the current training capacity might not match the needs. The government should thus monitor closely and regularly the needs of the sector and plan ahead for workforce development.

In the absence of localized content and Afghan e-commerce (which itself is inhibited by the absence of a comprehensive ICT law), greater adoption of new technologies will be initially fostered by government services: successful e-Governance and m-Governance endeavors will not only generate better and faster delivery of public services, but will also incent more Afghan companies and citizens to connect and have a productive use of IT. If design, development and O&M of such services are contracted locally, this will also increase the local production and maintenance capacity.

While there are a few activities to foster technological start-up developments, the market is probably not yet ready to accommodate the development of a successful net-economy. On the business-to-consumer side, a large impediment is the total lack of electronic payment means. The banking sector is under-developed and probably not yet solid enough to propose such means, but this will have to be addressed rapidly. For now, the only sources of revenues for digital B2C activities will be advertisement (low) and possibly payment through mobile money platforms. The latter should be made possible through an harmonization and interconnection of existing platforms, at least as a remedial means and as a potential long-term solution for online micro-payments.



# 1. INTRODUCTION

## 1.1 PURPOSE OF ASSESSMENT

The primary purpose of the assessment is to determine the impact of information and communication technology (ICT) on the Afghan economy and employment. The study estimates the extent to which ICT has contributed to economic growth and job creation since 2002, and forecasts future growth until 2017.

Altai Consulting examined public and private organizations in both the ICT and non-ICT sectors to assess the direct and indirect impact of ICT on the Afghan economy. We define direct impact as the revenue and employment generated by the ICT sector firms either directly or through contracts with their providers; and indirect impact as all the other effects of ICT services on non-ICT firms.

Measuring direct impact required researching a multitude of public and private organizations operating in the ICT sector itself, while indirect impact was measured by examining non-ICT public and private organizations.

The study is the first of its kind to measure the economic value of ICT activities in Afghanistan. The data, analyses and recommendations should be used to support the Ministry of Communications and Information Technology (MCIT) in formulating and enforcing evidence based policies and strategies in the ICT sector.

## 1.2 ASSESSMENT OBJECTIVES

Discussions with key stakeholders in the ICT sector determined that the research should focus on three main objectives. The research provides:

1. An estimation of economic impacts, 2002-2012
  - a. Communication technologies
  - b. Internet
  - c. Hardware and software
2. A forecast of future economic impacts, 2013-2017
  - a. Communication technologies
  - b. Internet
  - c. Hardware and software
3. An analysis of and recommended reforms on selected aspects of the public policy framework of the ICT sector, if applicable:
  - a. Internet naming conventions
  - b. Import regulations on IT hardware and software
  - c. Cyber security
  - d. Software certification

As a secondary objective, Altai Consulting attempts to measure the indirect impact of ICT on the Afghan economy by researching non-ICT public and private organizations, both large and small, to determine to what extent the introduction of new technologies has influenced business practices, increased revenues and profits, and created new employment opportunities

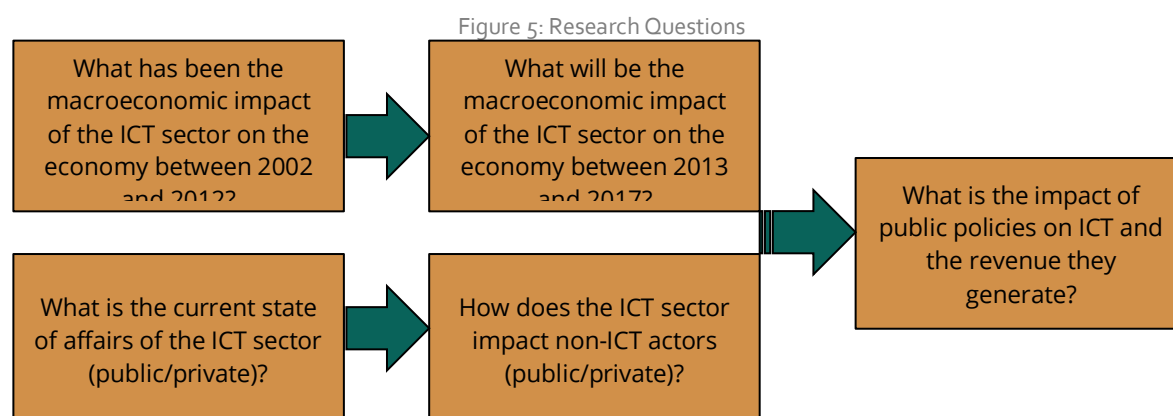
## 2. METHODOLOGY

### 2.1 APPROACH

#### 2.1.1 RESEARCH QUESTIONS

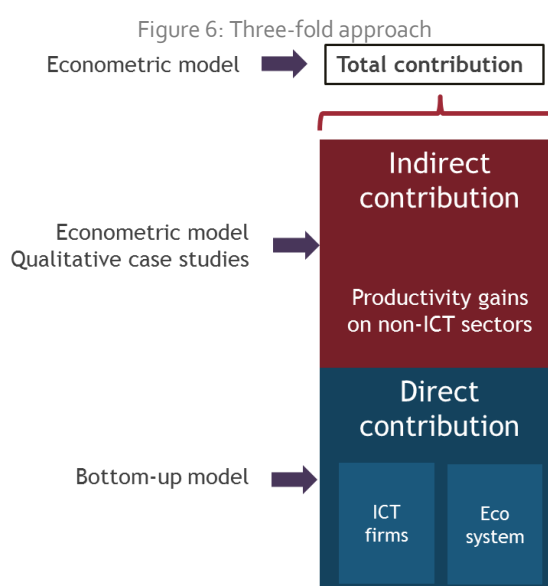
Altai Consulting designed the methodology based on five overarching research questions. The first two research questions, at the top of Figure 5, look at the macroeconomic impact of ICT. One focuses on the impact of new technologies over the past ten years (2002-2012), and the second requires forecasting the impact over the next four years (2013-2017). To address these two questions, Altai Consulting designed a macro-level econometric model based on data collected during fieldwork.

The two other research questions, at the bottom of Figure 5, orientated the research at the micro-level, looking at how ICT have transformed the way public and private organizations function. Answering these two questions involved conducting an assessment of the ICT sector, and identifying how ICT have changed how non-ICT sectors, companies and individuals operate. The fifth question has direct implications in terms of policy-making since it required evaluating how public policies have impacted ICT and the growth of the sector.



#### 2.1.2 APPROACH

The overall approach for the assignment was threefold. First, a bottom-up model was built for the sector using data collected from various segments of the sector, to assess direct impact. Second, econometric models were applied to aggregate macroeconomic data to estimate the overall impact of ICT at the macro level. Third, qualitative insights were collected at the micro-level, to build case studies that support the quantitative data but also to better conceptualize the extent to which ICT has impacted specific sectors, organizations, and individuals.



## MACRO-ECONOMIC COMPONENTS

In order to get a base for estimation of total impact of the ICT sector on the Afghan economy, a quantitative, macro-economic approach based on econometric models was necessary.

Various authors have used this approach, usually with data for panels of large number of countries, to guarantee the robustness of the model. The use of a macro-economic model was also meant to help distinguishing between 1) impact directly generated by the sector itself and its ecosystem, and 2) second-order impact on the economy through productivity gains, better service delivery, etc. Classically, direct impact is estimated by bottom-up sector models informed by field data, while the second-order impact is the remainder of the total GDP growth estimated by a regression model minus direct impact.

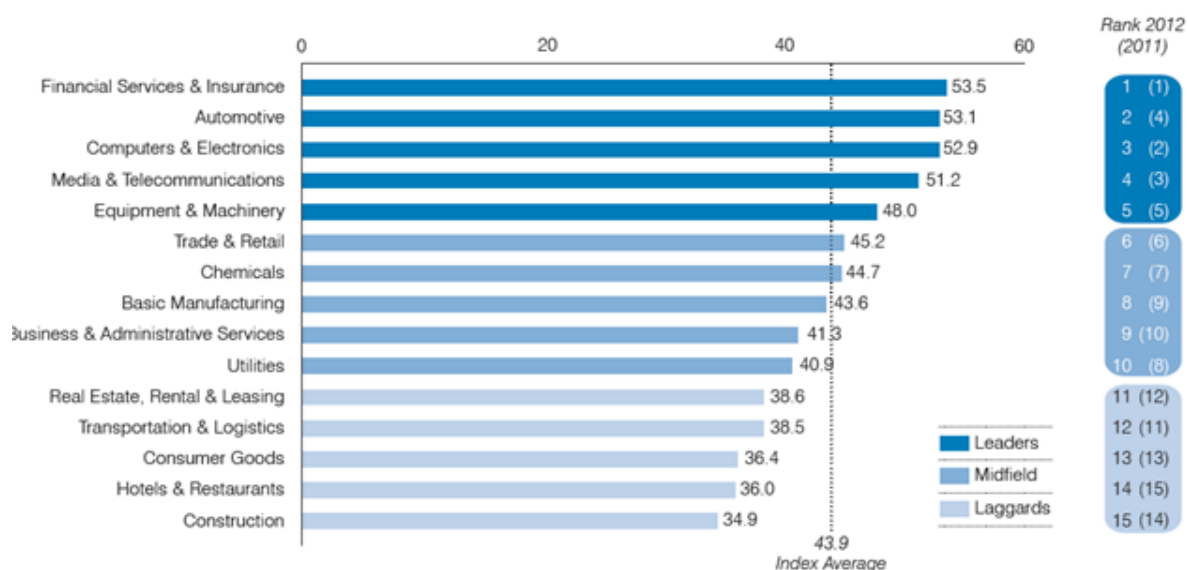
The first step was to review some of the existing models and their applicability to Afghanistan, in order to evaluate their strengths and weaknesses. After a small number of models were identified, Altai Consulting collected data points (at a national level) to be used as model inputs. The objective was to use several models to test their convergence using significantly different approaches and input data. However, it was anticipated that the very low number of available data points could make it impossible to reach a statistically robust model and/or to test for endogeneity. Indeed, all attempts to run the model with the very limited number of data points available (10 years at most) proved unsuccessful. The only alternative approach was then to use directly regression coefficients found by existing model on panel data. Two models were used: a widely cited model prepared by the World Bank, and a more elaborate model attempting to remove endogeneity, differentiate countries by levels of income, and take exposure time to communication technologies into account.

The next step was to add sensitivities to the base case, based on a small number of reasonably likely scenarios, including influential changes in the landscape of the sector, in applicable regulations, or in technical capacity. These scenarios do not take into account potential disruption of the political/security landscape. These scenarios were discussed with sector experts to assess their likeliness.

## MICRO-ECONOMIC COMPONENTS

The micro-economic components of the study are composed of case studies and key informant interviews (KIIs) with representatives of the ICT sector and of sectors significantly impacted by ICT. Sectors were chosen based on the likelihood of prevalent usage of ICT estimated by the Industry Digitization Index constructed by Booz & co in 2012, as depicted in the figure below, as well as by Altai Consulting's understanding of each sector's applicability and importance in Afghanistan.

Figure 7: Industry Digitization Index, 2012



Source: Booz et al, Industry Digitization Index 2012

In the private sector, Altai Consulting met with representatives of the main players in telecommunications, internet services, hardware and software industries. In addition, Altai Consulting conducted interviews with companies relying on ICT, such as financial institutions, online media, logistics firms, advertisement companies and also companies doing business with providers outside of Afghanistan.

In selected provinces outside of Kabul included in the research, Altai Consulting found that companies rely very little on ICT and so the research team focused mostly on analyzing the obstacles to a more extensive use of new technologies.

In the public sector, the research team met with MCIT, but also with several line Ministries such as the Ministry of Agriculture, Irrigation, and Livestock (MAIL), the Ministry of Public Health (MoPH) and the Ministry of Education (MoE). In each province visited, Altai Consulting interviewed the Director of the Directorate of Communications, Information, and Technology (DCIT) and a second line Ministry. These interviews assisted in assessing the use of ICT in public offices, whether equipment was available, how the staff was using it and whether ICT contributed to better service delivery.

The first objective of these interviews was to identify how ICT companies operate, looking at:

- The range of ICT companies' activities;
- How ICT activities have expanded in the last ten years,
- How ICT companies recruit and train their staff;
- How profitable they are;
- Perceived obstacles to greater profitability;
- Their strengths and weaknesses; and
- Whether they operate in a favorable environment.

The second objective was to examine how non-ICT companies are impacted by ICT, studying:

- How new technologies contribute to non-ICT companies' revenues;

- Whether these technologies have created new lines of businesses;
- How much companies spend on ICT every year;
- What sort of management and organizational changes have been associated with the introduction of ICT technologies;
- What types of ICT technologies have been most beneficial to the growth of companies;
- The influence of workforce skills in taking advantage of the adoption of ICT technologies
- How ICT has changed the character or mix of existing jobs; and
- Whether the introduction of ICT led to the creation of new jobs.

The third objective of the KIIs was to analyze how the work of public administrations has changed with the use of ICT, collecting information on:

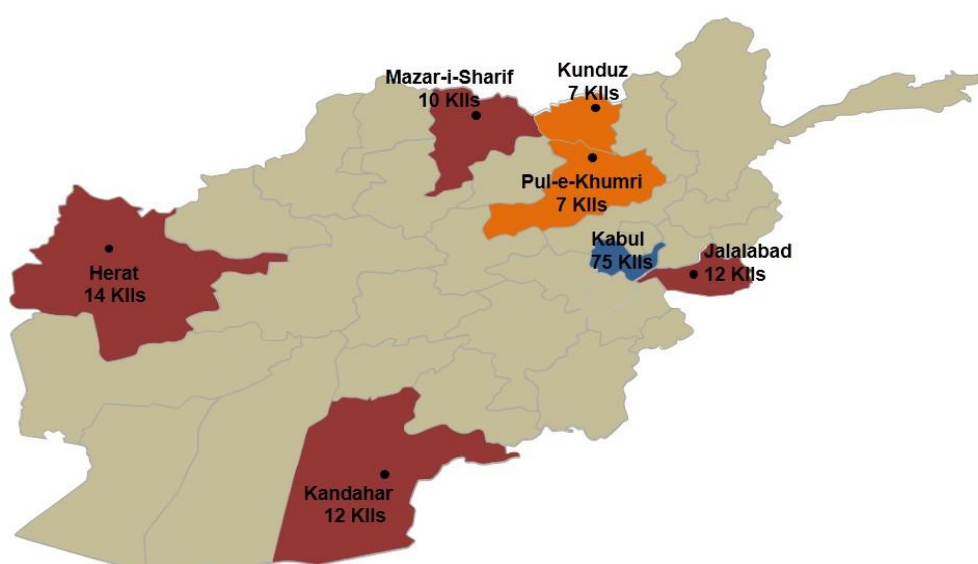
- To what extent central and provincial administrations have access to ICT;
- How much they invest in new technologies;
- How they train their staff to use ICT;
- Whether the use of ICT in public administrations has increased productivity; and
- Whether it has improved service delivery.

## 2.2 METHODOLOGY

### 2.2.1 SAMPLE

#### GEOGRAPHY

Figure 8: Overview of KIIs per Location



Altai Consulting interviewed a total of 137 individuals in 7 cities, Kabul (in blue), Herat, Mazar-e-Sharif, Kandahar, Jalalabad (in red), Pul-e-Khumri and Kunduz (in orange). In each location, Altai Consulting interviewed both public and private organizations, ICT and non-ICT companies. Altai

also met with associations related to the ICT sector such as the National ICT Alliance of Afghanistan (NICTAA) and the National ISP Association of Afghanistan (NISPA).

The respondents were the most senior representatives of the companies or Ministries available to Altai Consulting at the time of the interview. The interviews were normally followed by contacts with more technically oriented people to collect more details from the organization.

75 interviews were conducted in Kabul (in blue in the map above). This is mainly due to the fact that all of the offices of line Ministries and the largest firms are based in the capital. This is particularly true for the ICT sector, which is mainly developed in Kabul where access to electricity, the Internet and qualified staff is much easier than in other provinces. Thus, most of the ICT firms are located in the capital and this is where the main telecommunications and internet service providers have their headquarters.

In the main provincial capitals (in red), Herat, Mazar-e-Sharif, Kandahar and Jalalabad, the research team respectively conducted 14, 10, 12 and 12 interviews, including the main local ICT companies, provincial departments of line Ministries and other significant local firms. Altai Consulting selected these four cities because they are the most populated and economically developed in the country outside of Kabul. The interviews assisted in better understanding the local business environment and how the use of ICT is becoming more widespread in these key economic centers.

In the two medium-sized cities, Kunduz and Pul-e-Khumri (in orange color), seven interviews were organized. These interviews were conducted with line Ministries, local companies and small ICT players. The purpose of these discussions was to assess how new technologies have influenced the ability of local players to operate outside of the main urban centers, in areas where access to electricity and the Internet is less widespread.

### SELECTION OF TARGET KIIS

Altai Consulting identified the KIIs based on secondary research and preliminary discussions. For the public sector, the research team met with representatives of MCIT and the Afghanistan Telecommunication Regulatory Authority (ATRA) in Kabul and in some cases in the provinces. The interviews in the capital focused on national regulations and their enforcement, relations with the main ICT companies, Afghan Telecom in particular, and objectives and strategies in the near-term (until 2017). In the provinces, Altai Consulting studied local ICT policies and how new technologies have changed the way civil servants work and interact with the central government.

In addition, the research team met with selected Ministries in Kabul and Directorates in the provinces. Altai Consulting first interviewed representatives from the Ministry of Finance (MoF) since the Ministry is a strategic source of data for the macro-level econometric model. Altai Consulting also interviewed representatives at Ministries such as MAIL, MoE and MoPH. Altai Consulting looked at how each Ministry was using ICT, to what extent and for which purpose, and whether new technologies contributed to improved public services.

In the private sector, the research team met a large number of ICT companies: the main telecommunications operators, the largest internet services providers, IT services providers and hardware and software providers and importers. These interviews were helpful to assess the size of the ICT sector, and understand local dynamics regarding ICT business. Companies were chosen based on their size, their role in the sector and availability for interview during the short period of the assignment.

In addition, Altai Consulting interviewed key players in sectors significantly impacted by ICT, such as banks, media, logistics firms and trade companies. Within these sectors, firms were selected

based on their size, their use of ICT and availability for the study. Altai Consulting identified these businesses using the snowball method. Often the businesses were referred to us by ICT companies the research team interviewed. In the provinces, Altai Consulting targeted the companies with primarily a local presence, as opposed to national companies with provincial branches.

Altai Consulting conducted interviews with ICT associations, NISPAA and NICTAA, to understand their perception of the sector, its main achievements and weaknesses.

Altai Consulting also met with universities, training centers and professional staffing services, to discuss the state of the sector but also the prospects for better-trained human resources. Altai Consulting was particularly interested in the training offered to students in public and private institutions, and assessed the needs of the sector.

Finally, Altai Consulting met with donors and international organizations operating in the sector to discuss their assessment of ICT in Afghanistan, their past and current engagements in the sector and potential strategies over the next four years (*please see List of Key Informants for the full list of interviews*).

### 2.2.2 RESEARCH TEAM

A team of seven consultants (three international and four national) were tasked with the research. Given that this assessment required advanced research skills, Altai Consulting selected its most senior national consultants, with in-depth experience in qualitative research and a good knowledge of the ICT sector.

Altai Consulting's national consultants were also chosen based on their capacity to operate in permissive and non-permissive environments. For example, the national consultant who led the fieldwork in Kandahar has vast experience operating in the province. The national consultant who conducted interviews in Herat is from Herat City and is well connected with representatives from line Ministries and companies.

### 2.2.3 TOOLS

All of the interviews are qualitative. All of the questions were open-ended and based on background research conducted prior to each interview. As such, each KII guideline was adapted to the needs of each individual KII. The research team sought to capture the organization's use and perceptions of the ICT sector, but also how ICT supports business development, increases productivity and provides room for better service delivery.

## 2.3 RESEARCH LIMITATIONS

### 2.3.1 ICT SECTOR

For the purposes of this study, the telecommunications industry (fixed-line, mobile phone), the Internet industry (infrastructure providers, ISPs and development services), and IT hardware, software and services industries (IT service providers, training centers) are considered part of the ICT sector. Altai Consulting did not include the media as an ICT sub-sector, although we analyzed the impact of ICT on the media sector.



### 2.3.2 TIMELINE

The timeline for the project proved to be very challenging, especially given the celebration of Ashura<sup>1</sup> from 14<sup>th</sup> November to 16<sup>th</sup> November and the week of national holiday during the Loya Jirga<sup>2</sup> from 18<sup>th</sup> November to 24<sup>th</sup> November.

Given the timeline, Altai Consulting's approach was selective, instead of exhaustive. The list of KIs was defined based on a preliminary literature review and interviews with key players, interactions with and feedback from USAID during the inception phase, and it was also refined during fieldwork once more expertise was gained in the sector. Altai Consulting primarily targeted the most representative interlocutors.

### 2.3.3 AVAILABLE DATA

Although Altai Consulting pre-selected the key stakeholders it intended to meet with, they were not all available for an interview and so the research team had to adjust its initial target list during the fieldwork.

Moreover, the research team devoted special attention to collect data points regarding profits, revenues, costs, investments and employment in relation to ICT, but some companies refused to share this information due to confidentiality concerns. This was particularly the case in Kabul, for the largest companies, whereas smaller firms in the provinces were less reluctant to share data.

### 2.3.4 RELIABILITY OF DATA

Data was provided based on honest self-reporting. Altai Consulting's team is well versed in asking precise questions and seeking reliable answers, but in most cases did not have access to financial books of the companies it interviewed and so it could not verify the accuracy of all the information provided by the firms.

A number of firms, in particular in the provinces, are family business and they often do not keep accurate records of their activities and revenues. Furthermore, as AISA shared with Altai Consulting, some companies prefer to hide their actual revenues to avoid paying taxes.

### 2.3.5 MEASURING INDIRECT IMPACT

Assessing the impact of ICT on the Afghan economy requires looking both at the ICT sector, and other sectors indirectly impacted by new technologies. The difficulty lies in defining the notion of indirect impact. It can refer to new organizations or new management systems made possible by ICT, but also to increases in productivity and more broadly, to improvements in education and health.

Altai Consulting covered, at least at the qualitative level, all these dimensions to some degree but their inclusion in the econometric model depends on the existence of reliable data.

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<sup>1</sup> Ashura is a Shia celebration and it is a national holiday in Afghanistan.

<sup>2</sup> The Loya Jirga gathered in Kabul mid-November to discuss about the bilateral security agreement with the United States. During this week of national holiday, all the administrations were closed and only a few companies were open for business.

## 3. STATE OF THE ICT SECTOR

### KEY HIGHLIGHTS

- Estimated gross revenue generated in the ICT sector in 2013: \$1.81 billion<sup>1</sup>
- Estimated contribution of the ICT sector to the Afghanistan GDP in 2013: \$950 million
- Estimated total number of Afghans employed in the ICT sector in 2013: 138,500

### 3.1 TELECOMMUNICATIONS SECTOR<sup>2</sup>

#### 3.1.1 OVERVIEW

Table 1: Key Facts and Figures of the Telecommunications Sector<sup>3</sup>

Key players	<ul style="list-style-type: none"> <li>• MNOs: Roshan, MTN, Etisalat, AWCC</li> <li>• Landlines + CDMA: Afghan Telecom (state-owned)</li> <li>• Local Fixed Service Provider<sup>4</sup>: Wasel Telecom</li> </ul>
Services	<ul style="list-style-type: none"> <li>• GSM, CDMA, 3G, Fixed-line</li> </ul>
Sector Revenue	<ul style="list-style-type: none"> <li>• \$1.3 billion (2013)</li> </ul>
Total Investment	<ul style="list-style-type: none"> <li>• \$2.1 billion (2002-2013)</li> </ul>
Job Creation	<ul style="list-style-type: none"> <li>• Direct: 7,500</li> <li>• Indirect: 100,000</li> </ul>
Monthly Salary Range (Skilled Afghan)	<ul style="list-style-type: none"> <li>• \$600 - \$3,000</li> </ul>
Base Transceiver Stations (BTS)	<ul style="list-style-type: none"> <li>• 5,213</li> </ul>
Mobile Pop. Coverage	<ul style="list-style-type: none"> <li>• 88%<sup>5</sup></li> </ul>
Mobile Penetration <sup>6</sup>	<ul style="list-style-type: none"> <li>• 74%</li> </ul>
Total Mobile Subscriptions	<ul style="list-style-type: none"> <li>• 20.4 million</li> </ul>
Unique Mobile Subscribers	<ul style="list-style-type: none"> <li>• 12.2 million</li> </ul>
3G Subscribers	<ul style="list-style-type: none"> <li>• 1 million</li> </ul>
CDMA Subscribers	<ul style="list-style-type: none"> <li>• 174,000</li> </ul>
Fixed-line Subscribers	<ul style="list-style-type: none"> <li>• 93,000</li> </ul>
Key Regulatory and Legal Documents	<ul style="list-style-type: none"> <li>• Telecommunications and Internet Policy (2003)</li> <li>• Telecommunication Services Regulation Act (2005)</li> <li>• Universal Access Policy (2008)</li> <li>• New Telecom Law in draft form</li> </ul>

<sup>1</sup> This represents the sum of revenues for all sub-sectors. When expenses in infrastructure are removed (financed by telecommunication firms' revenue) as well as domestic interconnection costs (paid by telecommunication firms to each other), the net revenue is close to \$1.6 billion.

<sup>2</sup> In this section, we use telecommunications exclusively for telephone operators. Following sections will cover Internet providers and telecommunication infrastructure activities.

<sup>3</sup> Data based on figures produced by ATRA, GSMA Intelligence and primary data collection.

<sup>4</sup> Local Fixed Service Provider licenses are awarded to private companies that invest in providing fixed line and/or CDMA services to underserved rural areas.

<sup>5</sup> Percentage of Afghan population living in area covered by telecommunication networks (source: MCIT).

<sup>6</sup> Number of unique subscribers per 100 inhabitants aged 15-64.

In just 12 years, the telecommunications sector in Afghanistan has evolved from nearly non-existent to a major contributor to the Afghan economy. The sector has blossomed from very little infrastructure and no services in 2001 to an industry that has attracted over \$2 billion in total private investments, generated nearly \$200 million in government revenues in 2012, and the sector currently employs over 100,000 Afghans across the country. Research suggests there are 20.4 million mobile subscriptions (GSM, CDMA, and 3G combined – a large majority of them GSM) as of 2013 (over 95% pre-paid) in comparison to just 20,000 in 2002. Mobile population coverage has reached 88% with 5,213 base transceiver stations (BTS) located across the country. Furthermore, telephone penetration is estimated to be 74%<sup>1</sup>, and this number is expected to grow in the coming years as telecommunications services continue to expand into rural areas thanks to the expansion of critical infrastructure funded by the operators and by the Telecommunications Development Fund (TDF). Revenue generation, job creation, and ultimately the impact of connecting friends and families are the reasons why the telecommunications sector is widely considered a success story in Afghanistan.

### 3.1.2 TELECOMMUNICATIONS OPERATORS AT A GLANCE

Table 2 Key Players in the Telecommunications Sector

Zoom in on the Telecommunications Operators				
Players	Services	License Award	Total Subscriptions <sup>2</sup> (Market Share)	SIM <sup>3</sup> and Advertised Price Per Minute (Afs)
AWCC	GSM	April 2002	4 million (20%)	SIM: 100 Local: 2.99 (2.99 off-net) Int.: 5.5
Roshan	3G, GSM	January 2003	5.89 million (29%)	SIM: 100 Local: 3 (3.5 off-net) Int.: 6
MTN	3G, GSM	October 2005	5.91 million (29%)	SIM: 100 Local: 3 (3 off-net) Int.: 6 - 10
Etisalat	3G, GSM	May 2006	4.2 million (21%)	SIM: 100 Local: 2 (3.5 off-net) Int.: 5.5 – 9.5
Afghan Telecom (State-owned)	CDMA, fixed line, GSM/3G started in Feb. 2014	September 2005	Fixed/CDMA: 263,500 (1%)	SIM: 150 (CDMA) <sup>4</sup> Local: 1 (2 off-net) Int.: 5
Wasel Telecom	CDMA	May 2006	165,000 (1%)	SIM: 500/1,000 (w/ phone) Local: 1.925 (3.3 off-net) Int.: 10

<sup>1</sup> Number of unique subscribers per 100 inhabitants aged 15-64.

<sup>2</sup> GSMA Wireless Intelligence, fourth quarter 2013 and primary data collection. Includes CDMA, GSM, and 3G subscriptions. Market shares in “active SIMs” may differ since operators may not follow the same deactivation rules.

<sup>3</sup> Prices are indicative: SIMs from each operator includes phone credit. The amount of phone credit varies from operator to operator.

<sup>4</sup> Afghan Telecom introduced its GSM/3G offer in February 2014, with the following prices for the “Salam” plan: on-net calls: 1 Af/min (0.4 Afs/min for 5 registered numbers); off-net calls: 2.5 Afs/min; international calls: 5 Afs/min for 50 countries; 1 GB valid one month: 250 Afs; 5 GB valid one month: 900 Afs.

## AFGHAN WIRELESS COMMUNICATION COMPANY

As shown above, six major telecommunications operators are active in Afghanistan. Afghan Wireless Communication Company (AWCC), a joint venture between Telephone Systems International in the United States (80%) and MCIT (20%), was the first to be awarded a license in 2002<sup>1</sup>. AWCC is present in each province and reports 4 million subscribers (20% market share<sup>2</sup>), 94% of which use the prepaid service. AWCC has yet to enter into the 3G market, but is expected to do so in 2014. Moreover, AWCC directly employs approximately 3,500 individuals, none of which are outsourced. AWCC has moved into the mobile money market, as the MNO has launched its brand *My Money*, but the service is limited to Kabul at the present time.

## ROSHAN (TELECOMMUNICATION DEVELOPMENT COMPANY OF AFGHANISTAN)

Roshan entered the market in 2003<sup>3</sup> and has a presence in all provinces of the country and reports 5.9 million subscribers (29% market share), including an estimated 300,000 3G users. Roshan is entirely foreign owned, with the Aga Khan Fund for Economic Development (AKFED) having a 51% stake, Monaco Telecom 36.75%, and TeliaSonera 12.25%. Roshan directly employs more than 1,300 individuals, and accounts for more than 30,000 employment opportunities indirectly throughout the country. Roshan's *M-Paisa* is the mobile money industry leader in Afghanistan. Established in 2008, *M-Paisa* now has more than 300 active agents, with a presence in almost each province in Afghanistan.

## MTN

MTN Afghanistan is part of the MTN Group based in South Africa with global presence in 21 countries spread across Africa, the Middle East, and South Asia. MTN was awarded the third GSM license in 2005<sup>4</sup> and officially began operations in July 2006. MTN ranks first in subscription numbers (however, as noted above, definitions of active subscribers vary significantly across operators), just ahead of Roshan, at approximately 5.91 million for a market share of 29%. The MNO has a presence in all 34 provinces in Afghanistan. MTN directly employs 420 staff on a permanent basis and indirectly an estimated 35,000 individuals on a contractual and part-time basis as well as via partnerships (distributors, wholesalers, dealers, resellers, etc.). MTN Afghanistan has yet to launch its mobile money brand, but it is expected to do so in the coming years.

## ETISALAT

Etisalat Afghanistan, part of the U.A.E based Emirates Telecommunications Corporation with operations in 15 countries in the Middle East, Africa and Asia, was the fourth GSM market entrant in May 2006<sup>5</sup> and began operations in August 2007. As of June 2013, Etisalat reported 4,200,000 total subscribers (21% market share based on subscriptions), including 500,000 3G connections. Etisalat has a presence in all 34 provinces of Afghanistan (1,300 BTS), directly employs approximately 1,000 individuals (30% women, 90% Afghan), and estimates it indirectly generates more than 25,000 additional jobs. Etisalat also launched its mobile money brand *M-Hawala* in 2011.

<sup>1</sup> AWCC was provided a provisional license in April 2002 for \$1.2 million and after the establishment of the licensing scheme, a 15-year license for \$5 million.

<sup>2</sup> Market share by total number of active SIM subscribers.

<sup>3</sup> Roshan was awarded the second GSM license at a cost of \$5 million for a period of 15 years.

<sup>4</sup> Lebanese based Investcom and Alokozai-FZE purchased the GSM license for \$40.1 million in 2005 for a period of 15 years under the brand name Areeba. Areeba was subsequently purchased by the MTN Group in 2007.

<sup>5</sup> Etisalat purchased the GSM license for \$40.1 million for a period of 15 years.

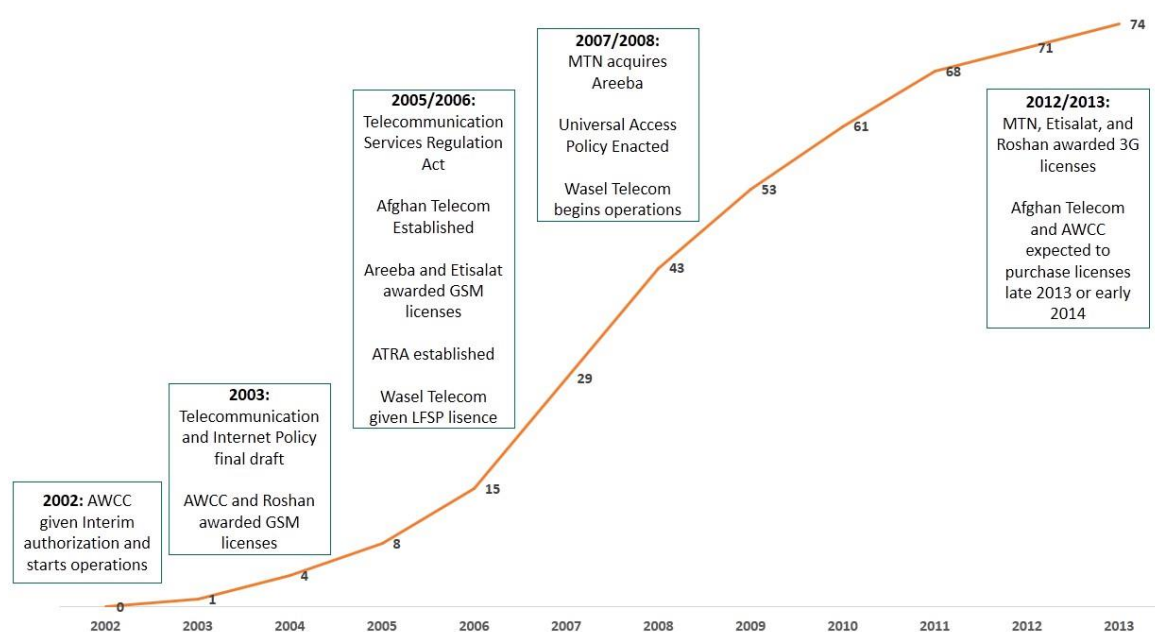
## AFGHAN TELECOM

Afghan Telecom, a state-owned telecommunications operator, was established in September 2005 and began providing services in 2006. Afghan Telecom is the only national fixed-line operator and benefits in owning and operating all state-owned telecom infrastructure and services, in particular the fiber optic backbone. As of June 2013, Afghan telecom has approximately 263,494 subscribers (170,494 CDMA and 93,000 fixed lines). Afghan Telecom start offering GSM and 3G services in February 2014. Afghan Telecom directly employs 1,300 individuals and indirectly more than 5,000 people throughout the country.

## WASEL TELECOM

Wasel telecom is a joint venture between the U.A.E based AG Telecom LLC, U.A.E based Modern Technology International, and two Afghan and Korean entrepreneurs, was awarded the first local fixed service provider (LFSP) license in May 2006 and began operations in May 2008. Wasel Telecom has 165,192 subscribers as of June 2013 and is a regional player, as all operations are situated in the northern provinces of Balkh, Baghlan, Kunduz, and Jawzjan. Wasel Telecom was in discussions to purchase Afghan Telecom's CDMA infrastructure, but the negotiations have been stopped for the time being and according to Afghan Telecom, the acquisition is unlikely to happen.

Figure 9: Telephone Penetration per 100 Inhabitants Aged 15-64



Source: Altai Consulting analysis

### 3.1.3 REGULATORY AND LEGAL ENVIRONMENT AT A GLANCE

The telecommunications operators are governed by the Telecommunications and Internet Policy (2003) and the Telecommunication Services Regulation Act (2005). The former promotes private investment and a level playing field, an environment that nurtures and accelerates industry growth, and market liberalization. A central piece of the 2005 Act is the establishment of Afghanistan Telecommunications Regulatory Authority (ATRA), which polices the

telecommunications operators. The 2005 Act also states laws associated with licensing regime and procedures, interconnection, co-location, scarce resources management, universal access, competition policy, penalties, sanctions, tariffs, and dispute resolution.

In 2008, the Universal Access Policy was introduced which highlights three objectives: (1) To put mechanisms into place that encourage investment for the development of rural communication networks; (2) To improve the socio-economic conditions of the rural areas by providing access to ICT facilities; and (3) To fill the access gap in rural areas by subsidizing rural projects that are commercially viable and also projects that are not commercially viable but deemed necessary by GIRoA. The Afghan Government implements these projects using the Telecommunication Development Fund (TDF) administered by ATRA and funded by the 4 major MNOs.

MNOs and other actors in the sector usually acknowledge that the regulation environment has been, until now, quite enabling and unobtrusive, but (as will be seen in the next sections), voiced concerns about the orientation that current policy is taking. ATRA has until now no real autonomy from the government and is seen as the technical branch of the Ministry in charge of licensing, managing TDF (see box below) and the spectrum. For the latter, ATRA does not seem to have either the technical ability to diagnose issues or the practical capacity to enforce regulations.

#### Case Study 1: ATRA

##### ATRA – Using TDF funds to fulfill universal access

The Afghanistan Telecommunication Regulation Authority<sup>1</sup> (ATRA) was established in 2005. It regulates licensing, frequency assignment, interconnection, consumer protection, and monitoring and enforcement.



In addition, ATRA manages the Telecom Development Fund (TDF). The 4 major MNOs contribute 2.5% of their net profits on a quarterly basis to the Fund. The initial objective of the TDF was to increase coverage in rural areas, but ATRA now also funds ICT projects in partnership with the Ministry of Education, the Ministry of Higher Education (MoHE) and the Ministry of Public Health as TDF contributions have become substantial with the success of the sector. For instance, the TDF funds the interconnection of public universities across the country.<sup>2</sup> In 2013, ATRA targeted between \$30 and \$40 million in projects.

### 3.1.4 EMPLOYMENT GENERATION

Research with operators suggests that the telecommunications sector generates 7,500 direct and approximately 100,000 indirect jobs across Afghanistan. The employment opportunities range from an abundance of unskilled scratch card sellers found on most street corners across the country, to 4,500 registered SIM card and/or mobile telephone and accessories dealerships, and a growing percentage of skilled professionals working in legal, technical, financial, operational, and administrative roles, among others. SIM cards dealers and scratch card resellers benefit from a sustained demand from customers. *"Everybody has a phone now,"* said a scratch card seller in Kabul, talking about the success of his business. Skilled jobs for Afghans start at \$600 per month and are reported to be as high as \$3,000 per month at the most senior level. One of the biggest impacts by the telecommunications sector on the Afghan economy is not only job creation, but the capacity building opportunities for local staff.

<sup>1</sup> Source: ATRA, <http://atra.gov.af/en>

<sup>2</sup> Source: ATRA, <http://atra.gov.af/en/news/five-universities-in-the-country-interconnected-via-fiber-optic>



Each telecommunications operator invests heavily in training staff members, often in-house: in the case of Etisalat, training courses are offered at headquarters in Dubai when required. MNOs staff are often sent abroad on specialized trainings on technical aspects for which no training is available in-country. MNOs' local staff capacity building efforts is not only technical: Roshan is sponsoring general education bachelors and masters degrees for its most promising Afghan staff in Kabul.

In the past 12 year, operators relied heavily on international staff. Nowadays, operators report a decrease in skilled international staff, and expect this trend to continue, partly thanks to increase in local capacity, and partly because the security and economic environment make it more less attractive to foreign workers. Overall, operators indeed report that local skilled labor has markedly improved since 2002, but it is still far from being at an optimal level, as quality education remains a challenge.

Although profit margins are limited, selling SIM and airtime (most often scratch cards) represents a regular source of income for a large number of Afghans, as more than 95% of Afghans users are on pre-paid services. The mobile telephony distribution network is organized in two parallel streams: SIM cards dealers are registered with MNOs and have to comply with a number of rules and regulations (in particular, register the identity of SIM cards holders). Phone credit distribution is in most cases channeled through a small number of wholesalers, distributing to a large number of small resellers, themselves sometimes reselling to yet smaller players. All SIM card dealers also provide credit, but the reverse is not true, and many credit resellers are not known by or registered with MNOs. Most SIM card dealers and credit resellers have little education and are scattered on nearly every major street corner. The difficulty of assessing the weight of the sector in terms of workforce is that the scratch card resellers are not registered telecommunication companies, they do not pay taxes and they do not even keep financial records.

It should be noted that airtime retail is dependent on the fact that the vast majority of mobile phone usage is prepaid, and on MNOs technology. A technological shift in credit distribution could make this workforce obsolete.

#### Case Study 2: Scratch Card Wholesaler and SIM Card Dealer, Kabul

##### **Ensaf Scratch Card Wholesaler and SIM Card Dealer – Sustained Income**

Ahmad Jawid has been operating in the scratch card and SIM card business for two years in Kabul. He specializes in purchasing scratch cards and SIM cards in bulk from the 4 major MNOs. For example, he usually purchases 1,000,000 Afs (about \$17,715<sup>1</sup>) worth of scratch cards at a discounted price of around 900,000 Afs (about \$15,940), and then sells them to local shops and resellers at a 2% margin. Ahmad is much more careful regarding distribution of SIM cards, as selling SIM cards to untrustworthy shop owners who do not register SIM purchasers could result in him being blacklisted from the MNOs. His margin on SIM cards is 4%.

Ahmad understands that competition is high, estimating approximately 30,000 scratch card dealers and resellers in Kabul alone. Since margins are low, the key to success is bulk sales, quick inventory turnover, and establishing and fostering relationships with the MNOs as well as with clients. Ahmad estimates profits are 30,000 Afs (\$530) per month.

<sup>1</sup> Exchange rate used throughout the assessment is \$1 USD is equal to 56.25 Afs (Dec. 31, 2013), and the rounded.



## Case Study 3: Scratch Card Reseller, Pul-e-Khumri

**Mohammad's Scratch Card Reseller – Undercutting Competition and Reluctant to Sell SIM Cards**

In 2010, Mohammad opened a scratch card shop with his brother in a strategic location: at the center of the bazaar. He sells scratch cards from all the telecommunications companies: AWCC, Etisalat, Roshan, MTN and Afghan Telecom. His location has been a key asset and his revenues have more than doubled since 2010. His main clients are government officials and shopkeepers from the bazaar. His largest customer is a local sugar factory that buys scratch cards for their staff for nearly 165,000 Afs every month (\$2,920).

Mohammad's shop is also popular because he sells the cards at a cheaper price. For instance, he would buy a 500 Afs scratch card (\$8.86) for 460 Afs (\$7.91) from the wholesaler, and sells it at 470 Afs (\$8.15), 30 Afs (\$0.53) cheaper than its face value. He states he sells 1,000 to 1,200 cards every day, although he may over-estimate the actual run-rate.

Mohammad chose not to sell SIM cards. *"It is too complicated,"* he said. He added that he would need to hire more staff to take care of the registration forms, and he does not think this would be more profitable as SIM dealers often run into challenges with operators if there are any errors in registration. This is due to the fact that operators are fined by ATRA if the dealers do not register SIMs. In turn, operators hold their wholesalers responsible, who then blacklist SIM card dealers. ATRA states that only half of the dealers register SIM cards when they are purchased.

The two brothers are very pleased with the development of their activities. *"We have more and more benefits, year by year,"* noted Mohammad.

### 3.1.5 ASSESSMENT OF THE TELECOMMUNICATIONS SECTOR

#### IMPACT

The development of the telecommunications sector over the past 12 years is undeniably one of Afghanistan's greatest success stories in the post-Taliban era. The sector has brought more than \$2 billion worth of cumulative investments, accounts for more than 100,000 jobs, and has brought families, friends, colleagues and business partners closer together by providing affordable communication links. Just 12 years ago, very little infrastructure and no services were in place and Afghans had to visit neighboring countries just to place a phone call or travel between cities and villages to communicate with each other in-person. In 2003, telecommunication services were virtually unaffordable to the general public as SIM cards cost \$250 and a local call \$0.36 per minute. In 2013, a SIM card costs less than two dollars (100 Afs) and local calls typically cost \$0.05 (3 Afs) per minute – excluding free minutes offered at recharges, which further reduce the actual average price per minute. It is even expected that the prices of SIMs and phone calls will further decrease once Afghan Telecom enters the GSM and 3G market.

The growth of the telecommunications sector has brought critical infrastructure to Afghanistan. The establishment of the microwave network and 5,213 BTS across the country, covering 88% of the population, has expanded the market to reach more than 20 million mobile subscriptions, 88% population coverage, equating to a telephone penetration of 74% in 2013. The national fiber optic backbone is an ongoing project, likely to continue in the medium term. In its first phases, it will lay more than 5,000 km of cable (2,300 of which are already operational), connecting 23 provincial capitals and will connect Afghanistan with five neighboring countries: Iran, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan (for further details, see section 3.3 below).

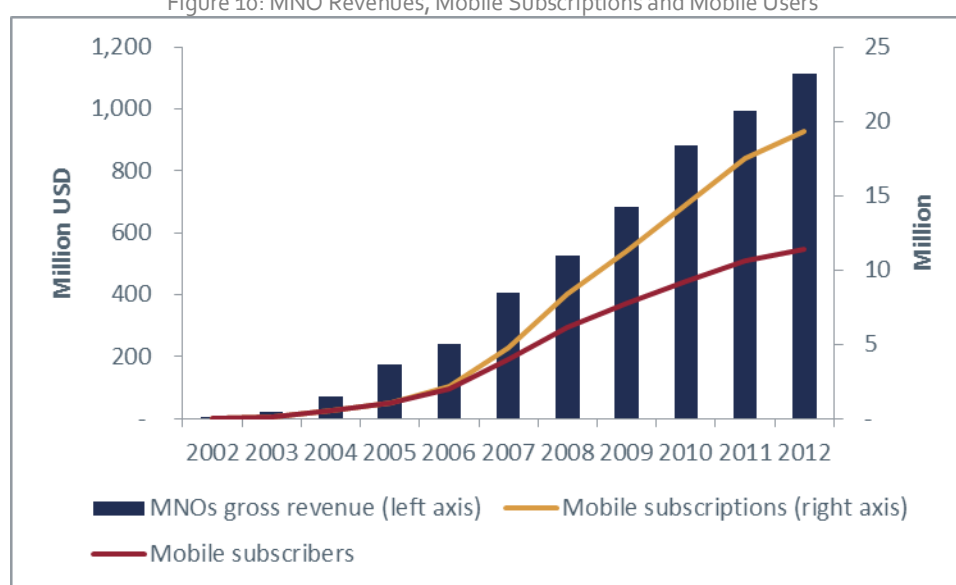
The telecommunications sector accounted for \$198 million in fiscal revenue in 2012. In addition, the MNOs contribute 2.5% of net profits per quarter to the TDF. The fund is used by ATRA to

support the development of the telecommunications, health, and education sectors, primarily in rural areas.

The largest part of the ICT sector contribution to GDP and employment is generated by MNOs, essentially through the 4 current GSM operators. MNOs do not usually disclose financial data, but in order to build credible growth scenarios, it is important to try and understand their revenue and costs structures and their evolution over the past ten years. Figures given below are estimates and should be understood as indicative only.

Estimates, based on wireless intelligence data<sup>1</sup>, indicate total revenue for the operators at \$1.113 billion for 2012. The sector revenue has seen a steady growth since 2002, and had a compound annual growth rate (CAGR) of 22% between 2007 and 2012. To this revenue should be added 8% to 10% for the revenue of the large network of distributors (MNOs offer scratch cards at a discount to face value to distributors and only record the discounted value as revenues), leading to a total of \$1.2 billion for 2012, and a total of \$5.5 billion between 2002 and 2012.

Figure 10: MNO Revenues, Mobile Subscriptions and Mobile Users



Source: GSMA Intelligence

The market has been driven for the largest part by a combination of extension of coverage, which has progressively reached more than 85% of the population, and decrease in prices (local on-net calls prices have decreased by a factor of 9 since 2002). Both factors played key roles in a context of increased competition with four GSM licenses being awarded in the period: the Herfindahl-Hirschman Index (HHI), measuring the degree of concentration of the sector<sup>2</sup>, went down from 1 in 2002 to 0.24 in 2013<sup>3</sup>. While in December 2012, ATRA mentioned that no operator had

<sup>1</sup> MNOs do not usually disclose financial data. Requests made to Ministry of Finance for aggregated figures were not honored. In this section, many of the modelled figures are from GSMA Intelligence (both compiled and modelled data were retrieved in December, 2013), checked against (and sometimes corrected by) individual data points available to us.

<sup>2</sup> The HHI is the sum of the squares of market shares for all actors of a sector, either expressed in percentage points or in percent. HHI varies from 10,000 (percentage points method) or 1 (percentage method) for a monopolistic market) down to 0 for a purely competitive market with infinite number of actors.

<sup>3</sup> Note that the notion of "active SIM card" may vary between the operators. Usually, a user is considered active when he has made a connection within the past 90 days, but there is likelihood that some operators

Significant Market Power (SMP), i.e., more than 30% of market share, the regulator mentioned in February 2013<sup>1</sup> that *“Roshan has now been designated by ATRA as having SMP”*.

The document further explains that *“Under the Telecom Law, SMP operators have a number of additional obligations. One such obligation is to publish their charges for interconnection in a Reference Interconnection Offer (“RIO”) and that these charges must be based on Forward-Looking Long-Run Incremental Cost (“LRIC”).”* This serves as an argument to revisit calculation methods for interconnection prices (see below).

## MOBILE PHONE USERS

Geographic coverage differentiation (initially), costs of off-net calls, and prevalence of pre-paid subscriptions have incited Afghan customers to use multiple operators at once. It is estimated that mobile phone users have on average 1.7<sup>2</sup> SIM cards. The number of active subscriptions, above 20 million<sup>3</sup>, translates into approximately 12.2 million unique subscribers, representing 74% of the Afghan population aged between 15 and 64, or 37% of the total Afghan population.

When taken into consideration that nearly half of the Afghan population is below 15 years old, that the mobile phone network covers about 88% of the settled population, and a small proportion of Afghans living within coverage area who cannot afford using mobile phones, Altai estimates that between 85% and 90% of the addressable market has access to a mobile phone.

## REVENUE STRUCTURE

GSMA estimates that *recurring revenue*, the part of the revenue directly linked to MNOs core activity, was just under \$1 billion for 2012.

While the number of subscribers has increased rapidly, the average revenue per subscription (known as Average Revenue Per User, or ARPU) has decreased, from \$17 per month in 2002 to slightly above \$4 per month. The revenue is for the largest part provided by voice services, data services accounting for 3 to 5% and value-added services from 5% to 12% depending on operators. Roaming represents about 3 to 5% of revenue<sup>4</sup>.

## ESTIMATING MNOs COSTS

MNOs don't communicate on their costs, so we can only provide very crude estimates of their cost structure. ATRA mentions that MNOs have collectively spent \$2.071 billion in capital expenditures since 2002, or \$1.922 billion between 2002 and 2012, representing 38% of the total revenue during the same period.

According to MCIT, a total of \$1.063 billion of contributions have been made to Government revenue from 2002 to 2012. A part of this represents GSM and 3G licenses (counted by MNOs as capital expenditure), while the remainder represents various taxes (BRT, withholding tax, Universal Access contribution, and income tax).

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report significantly higher number of active users than they would have with this rule. In the following, we use figures declared by operators to ATRA.

<sup>1</sup> ATRA, Interconnection Consultation Public Notice, 20/02/2013, section 1.2

<sup>2</sup> Source: GSMA Intelligence. This figure is probably on the high side if considering SIM cards actively used.

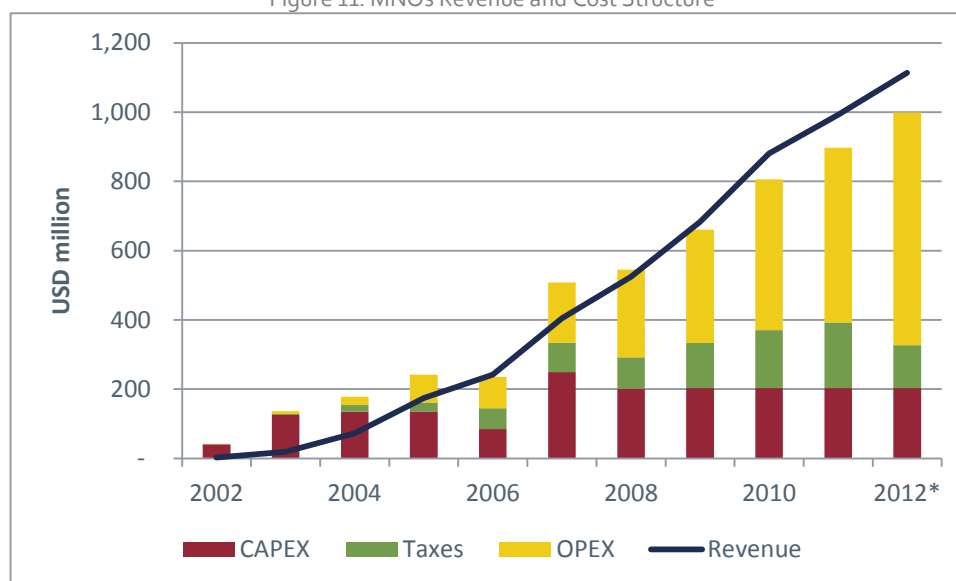
<sup>3</sup> ATRA, Notice for public consultation proceeding on the costs of interconnection, 2012 ([link](#))

<sup>4</sup> Based on key informant interviews with the major MNOs.

MNOs interviewed estimate the industry's EBITDA<sup>1</sup> margin as between 25% and 30% in 2013, which is low in comparison to markets with similar environments in Africa and the Middle-East<sup>2</sup>. Over the decade, the EBITDA margin went down gradually from circa 45% to 30%, reflecting growing competition and more user-oriented regulations (such as low interconnection price), which, along with previously mentioned figures would tend to show operational expenses represent on average about 50% of the operators' revenue.

Key operating costs are probably higher than in more mature markets, reflecting high energy, security and maintenance costs. Cell towers often rely on generators to operate and some have to be guarded, as insurgents repeatedly blow up towers<sup>3</sup>.

Figure 11: MNOs Revenue and Cost Structure



Sources: GSMA Intelligence, MCIT and Altai Consulting analysis

\* Taxes figure for 2012 covers only 9 months due to change in fiscal year.

## PERSPECTIVES OF GROWTH

The very rapid growth of the sector has been driven by the extension of coverage, as suggested by the high percentage of addressable market effectively captured since 2006-2007. The rural structure of the Afghanistan demographics will make it harder to private sector actors to extend their coverage to the remaining 12% of the population living in unserved remote places. This is now the role of the Telecommunication Development Fund (effectively funded by MNOs). However, it is expected that TDF activities will only marginally increase the revenue and employment of the sector.

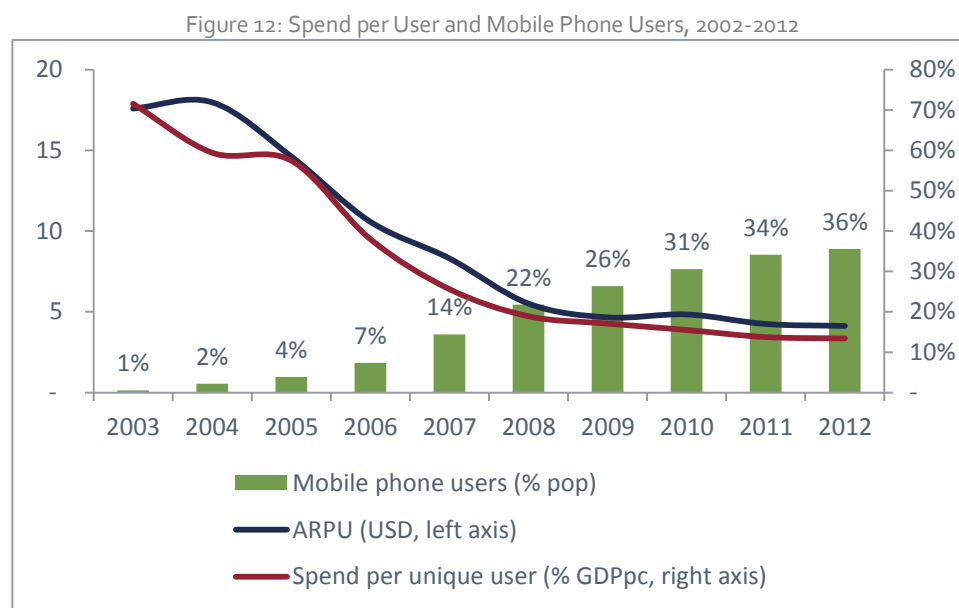
Despite an increase in usage of value-added services and in data communication in the past few years, the average revenue per user (or, by comparison, the average spend per unique user as part of the GDP per capita) seems to have stabilized on the same period, which suggests that non-voice services at best compensate for the decrease in voice revenues. Figure 12 also shows

<sup>1</sup> Earnings before interest, taxes, depreciation and amortization – a measure of operational profitability of a business.

<sup>2</sup> In Iraq, for example, Zain reported an EBITDA margin close to 40% and Asiacell around 52% (2012).

<sup>3</sup> Roshan mentioned 18 towers were damaged during the 2009 presidential elections, and Etisalat explained that one of their towers has been partially or completely destroyed 8 times.

that larger spend in telecommunications in the 2003-2006 period was predominantly that of higher-disposable income population.



Sources: MCIT/ATRA, GSMA Intelligence and Altai Consulting analysis

The future growth of the sector will probably be mostly driven by demographic growth. Each year brings an additional 350,000 to 400,000 young potential mobile phone customers to the age of 15, and as Afghans get mobile phones younger, demographic growth and the structure of Afghanistan's age pyramid will be important factors of growth for the sector.

Now that the network extension phase is about to be completed, competition between operators will continue further depleting legacy revenues: the introduction of Afghan Telecom as a GSM/3G operator and the possible decrease in Mobile Termination Rates (MTRs) are likely to further challenge operators' profitability, and increase the risk profile of their long-term investment. This could reduce their willingness to invest in less profitable areas.

Set by the regulator, MTRs have been stable since 2009, at 1.5 Afs (\$2.7 cents) per minute. This price is expected to be revised downwards in January 2014, and ATRA has started a public consultation<sup>1</sup> about reforming the approach to calculating these prices, from a fixed value to a cost-driven model, with the clear objective to bring the MTRs down to cost. This is meant to reduce market power, and making competition more open, which should eventually result in lower prices. However, this should also result in a decrease in profitability of operators.

Increases in competition have a particular negative impact on the bottom-line of MNOs considering Afghanistan is a market that is already very competitive, with 4 major MNOs for an addressable market of 15 million individuals (see Section 3.8 below for further discussion on this effect).

Uncertainty in the environment (political, stability, withdrawal) may further reduce operators' appetite for risk in investing in growth. Operators anticipate the number of roaming users will decrease with the withdrawal of troops and the gradual decrease in foreign assistance. Added to the alignment in roaming fees, and possible increase in replacement of roaming calls by VoIP, the part of MNOs' revenue brought by roaming should become noticeably smaller. While roaming

<sup>1</sup> ATRA, Notice for public consultation proceeding on the costs of interconnection, 2012 ([link](#)).

already represents a smaller portion of MNO's revenues, this is problematic inasmuch as it is still an important generator of profit margin for operators.

Finally, the exchange rate between Afghani and US dollar has suddenly increased from 51.3 Afs/USD in January 2013 to 56.25 by the end of December, A depreciation of 9% in one year has a large impact on companies whose revenues are in Afghani and have to pay interests and vendors in Dollars.

## MOBILE BROADBAND

As will be covered in the next section, the number of internet users has grown rapidly in the recent years. As broadband usage becomes more than anecdotal, it is legitimate to ask if mobile broadband could, eventually, become a substantial driver of growth for the sector.

Access to mobile broadband (MBB) is constrained by coverage, terminal price and literacy rate. Usage of MBB can be constrained by cost, availability of localized services and applications, and quality of service.

### Access

Current coverage is restricted to the main cities, or about 20% of the population. It is unclear how much effort MNOs will put on extending coverage, as this represents significant investment in a context where margins are shrinking, but we can assume that by 2017, all cities with more than 100,000 inhabitants will be covered, representing a total of 32% of the population.

The average literacy rate in the country was estimated to be 39% in 2011<sup>1</sup>, and had increased by 6 points since 2001. This is likely to be near 60% in urban areas currently covered by 3G service, and could possibly increase in these areas to 70% by 2017, driven by a large school enrolment of a young population.

Mobile broadband was launched in Afghanistan at a time where 3G handsets have become relatively affordable: 3G enabled handsets can be found as cheap as \$30 in Kabul, but more typically, an entry-level, branded Android handset costs about \$100<sup>2</sup>. This is still significant when compared to average Afghan income, but less so when we consider the target population for mobile broadband services (urban, literate, employed, aged 15-64). Based on average revenue figures in this population, we assume that as much as 80% (in 2013) to 90% (in 2017) of this target group could therefore afford an entry-level 3G enabled handset should they be willing to.

The total addressable market<sup>3</sup> for data services, taking into account these hypotheses of coverage, literacy, age and revenue, would thus represent 1.7 million in 2013, and possibly 3.7 million individuals in 2017.

Of a 1.7 million people current addressable market, the three current 3G operators (MTN, Etisalat and Roshan) claim a combined 1 million mobile broadband subscriptions<sup>4</sup>. This would indicate that nearly two thirds of the addressable market has been reached within a year of operation.

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<sup>1</sup> Source: UNICEF ([link](#)).

<sup>2</sup> Source: store check in Kabul, December 2013.

<sup>3</sup> Here, addressable market is understood as the potential market at a given moment in time and geographic coverage. Since geographic coverage can increase rapidly, the addressable market can as well.

<sup>4</sup> The definition of active MBB subscription is even less clearly agreed upon than that of active SIM. It usually reflects a minimum level of data usage per month (e.g. 1 MB in the last 30 days).

## Usage

The mobile broadband market is (as of December 2013) in its infancy and as such, it is difficult to adequately assess precise figures. Mobile broadband costs are high: typically 1.16 Afs (\$.02) per MB for a 200 MB weekly bundle. Assuming only 20% to 50% of MNOs' data revenue is coming from 3G usage (the rest being SMS, MMS), this would lead to between 683 Afs (\$12) and 1,704 Afs (\$30) in 3G revenue per user. The average price above would lead to an average yearly consumption of 580 to 1,450 MB per user in 2013, or (considering a linear growth in terms of users), 50 to 120 MB per user per month<sup>1</sup>. Usage on handsets is probably on the low side of this interval, as 3G dongle users certainly make for the largest part of the traffic.

In the near future, usage will probably not be driven up by localized content, for which development is barely starting<sup>2</sup>. It is unlikely that more than a minor fraction of MBB users (typically early adopters) will become intensive users and will generate a high level of traffic.

Concurrently to increase in adoption, cost per MB should decrease: already, three operators are offering 3G services and AWCC will soon do so. Afghan Telecom is also likely enter the GSM/3G market with a strong experience and infrastructure in broadband, although it will probably take some time before it reaches a significant market share. Decrease in fixed broadband prices and better service availability (e.g. in the provinces) might also limit SMEs and household usage of 3G dongles.

In more developed countries where Internet usage was already high by the introduction of MBB services, network capacity has been known to constrain 3G usage. In Afghanistan, MNOs consider that while frequency allocation is not perfect, this should not pose any constraint to extension of data usage in the near future.

## Conclusions

Thanks to increase in coverage and adoption rate, there is significant long-term growth potential for data revenue in the near future. However (as experienced in more mature markets), this additional revenue might not completely compensate current decrease in voice revenue until the end of the period considered. These elements will be expanded in Section 3.8, looking at scenarios of growth.

## CHALLENGES

Despite a well-documented success, numerous challenges have been mentioned by key stakeholders that could potentially inhibit the future growth of the telecommunications sector.

First, Afghan Telecom's entrance into the GSM and 3G market presents a conflict of interest. Whether true or not, a common perception among private sector MNOs is that Afghan Telecom, a 100% state-owned organization, will be given preferential treatment by the regulatory authority, ATRA. Allowing Afghan Telecom to enter the market while it didn't have to pay for a

<sup>1</sup> This is consistent with figures observed in other countries for small and large screen devices respectively.

<sup>2</sup> As of August, 2013, less than 10 Afghan-based mobile software providers and 5 content providers had been identified (Source: InfoDev, 2013). See also section 0 below. However, Kabul Polytechnic University now offers two classes in mobile application programming, and the first students of the beginning class have recently graduated.



license, enforcing a 45% decrease in MTRs<sup>1</sup> to assist Afghan Telecom's entrance into the GSM and 3G market, and allowing it to keep monopolistic access to the national optic fiber infrastructure are examples provided by MNOs that highlight a bias towards Afghan Telecom. MCIT and ATRA should work to change this perception, as trust in the regulatory bodies (until now perceived as benevolent towards private sector investors) is a critical factor in MNOs continuing to invest in the sector.

Second, there is a perception among MNOs that MCIT and ATRA position unreasonably favors consumers and as a result, the sector is becoming over-regulated.

It must be said that the regulatory authorities have so far had a very positive impact on the development of the sector in the country: the governance of the sector has exceeded expectations and enabled very rapid and robust development of the infrastructure, while allowing access to telecommunication services to the largest part of Afghan citizens.

It is commonly felt that the regulatory authorities are now focused on driving down prices to make telecommunications services more affordable and to increase penetration among poor and low income Afghans, as per the Universal Access Policy. However, as prices continue to drop and competition increases with Afghan Telecom's entering the market, the business environment becomes less profitable for MNOs. While MCIT and ATRA state that the price of telecommunications services in Afghanistan are higher than in neighboring countries, MNOs point to the fact that OPEX are substantially higher than in neighboring countries. Furthermore, MNOs claim they are not allowed to invest in promoting value added services or to push services in the same way as in other markets. This is resulting in a decrease in revenue for new products and services.

Third, a lack of adequate technical education means that MNOs have to conduct lengthy and expensive in-house or outsourced training for new staff members, or alternatively hire expensive international staff.

Fourth, the lack of a manufacturing industry in Afghanistan<sup>2</sup> means that materials and equipment for infrastructure must be imported. In both instances, this raises the OPEX for market players, decreases profits, and lowers efficiency. More specifically, a lack of adequate technical labor potentially reduces the quality and efficiency of outputs and the importation of materials and equipment translates into OPEX largely paid in Dollars whereas revenues are in Afghanis. If the Afghani continues to depreciate in value, EBIT margins will be strongly impacted.

Fifth, a volatile political and security situation deters new market entrants, especially in regards to new LFSPs that could potentially serve rural areas currently off the grid. However, there is consensus among current market players and ATRA that 4 national mobile carriers is enough to serve Afghanistan, when looking at international benchmarks for markets of a similar size and context. Furthermore, the upcoming presidential election and the uncertainty surrounding the troop withdrawal in 2014 also dissuade current market players from making further substantial investments in the telecommunications sector. MNOs highlighted how the deteriorating security situation is already noticeable in some regions in the country. Others highlight that the construction of the fiber optic cable is slow to be completed due to constant security threats and it is believed that this will continue for the foreseeable future.

<sup>1</sup> By decree, MNOs was supposed to decrease MTRs by 45% by January 1, 2014. However, this should take effect when Afghan Telecom effectively enters the GSM and 3G market. See section 3.8 for further discussion about MTRs.

<sup>2</sup> To our knowledge, there is only one electronics manufacturer (Blue Sonic), planning to start manufacturing in-country soon.

Other challenges for the growth of the telecommunications sector include a high tax structure, mandatory contributions imposed by ATRA such as the TDF, a lack of sustainable electrification, illiteracy and poverty among a large percentage of the Afghan population, and lack of content available in local languages.

### **FUTURE OUTLOOK**

In just 12 years, the telecommunications sector in Afghanistan has become one of the largest contributors to the Afghan economy, and it will continue to be a major source of revenue and employment for Afghanistan for the foreseeable future. However, the market, particularly for voice services, is near saturation and the operators are facing margin deterioration at a moment of key investment needs for broadband and value-added services. The emergence of 3G in 2012 and the potential investment in 4G technology in the coming years is an opportunity for MNOs to offer new and higher added-value services. The investment in m-Government, e-Government, other value added services and the emergence of mobile money offer new ways to diversify business offerings and regain a competitive advantage.

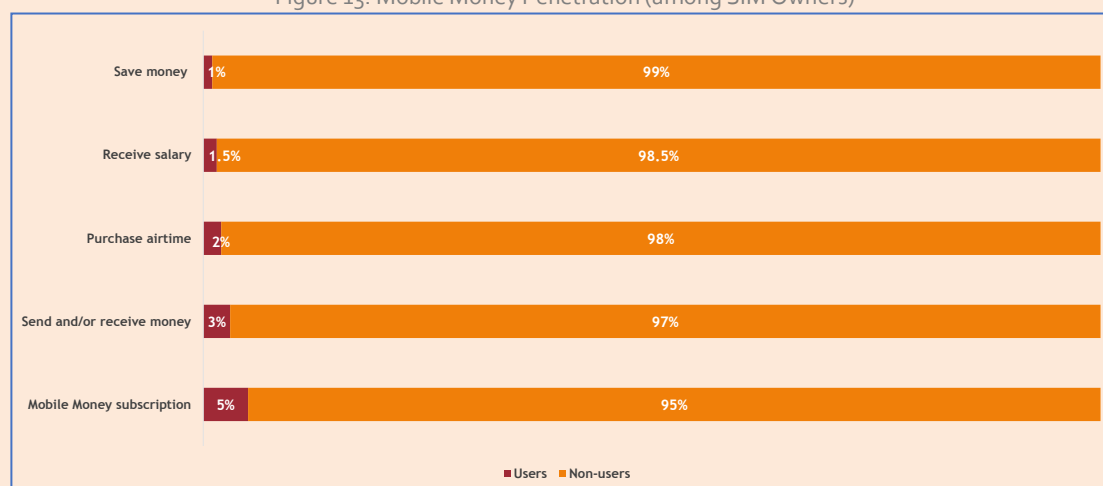
Having said this, MNOs fear that more consumer-oriented policy and regulations, coupled with the uncertainty in 2014, will result in stagnation or even decrease in revenue across the mobile telecommunications sector. This would, in turn impact the MNOs capacity to extend mobile broadband services to less populated areas and their contribution to the TDF, thus impede ATRA's ability to achieve universal access. Beyond 2014, MNO's believe the market can stabilize, but this is dependent on some external factors. First, the security situation remains on par or improves. Second, local capacity continues to improve through better education opportunities for Afghans. Third, donors such as the World Bank and USAID focus on programs that build the capacity of ATRA to govern the sector more effectively and fairly, in particular, regarding transparency and conflict of interest issues. Fourth, the regulatory authorities should consider a more pro-business choice and look to sustain current market prices instead of driving them lower, since it is unlikely OPEX will decrease in the near to mid-term future.

## Case Study 4: Mobile Money

**Mobile Money has yet to take a foothold in Afghanistan**

Roshan's *M-Paisa*, Etisalat's *M-Hawala*, and AWCC's *My Money* are the current mobile money service providers in Afghanistan. MTN has yet to launch its brand. While mobile money has been a success in some parts of Africa, in particular Kenya, to "bank the unbanked", m-money has yet to break through in Afghanistan. On a national scale, recent research funded by USAID/FAIDA and conducted by Altai Consulting found that 5% of SIM owners have subscribed to mobile money but only two-thirds of subscribers actually perform functional transactions, with most services essentially not used at all.

Figure 13: Mobile Money Penetration (among SIM Owners)



Source: Altai Consulting analysis for USAID/FAIDA

**Select Key Findings:**

- Users are predominantly recipients of funds and prefer to withdraw money from banks even if non-bank agents are easy to reach. Regular usage of the service remains a challenge.
- While 56% of respondents stated they would consider subscribing to mobile money, there is a general lack of awareness of the service, understanding of its value, and also a general lack of need for financial services. Business owners are also often skeptical of mobile money.
- A lack of savings, lack of awareness, the perception that mobile money is too complicated, and to some un-Islamic, were identified as barriers to market penetration. Respondents also suggested a critical mass of users is necessary for them to subscribe. Moreover, reputation and liquidity of agents, in particular non-bank agents, is a major barrier, as well as user preference to withdraw all money at once. Mobile money agents have reportedly little incentive to follow the rules as profits are limited by infrequent withdrawals.
- Private and public entities can be used as levers to boost penetration of mobile money. At the same time, a focus should be put on increasing awareness of the service while reinforcing its value proposition to the Afghan public.

## 3.2 INTERNET SERVICE PROVIDERS

### 3.2.1 OVERVIEW

Table 3: Key Facts and Figures of the ISP Sector

<b>Key players</b>	<ul style="list-style-type: none"> <li>51 licensed ISPs, 70 to 80 unlicensed ISPs (estimate)</li> <li>Main ISP and wholesaler: Afghan Telecom</li> <li>NEDA, Io Global, CereTechs, INSTA, Rana, New Dunia, Multinet</li> </ul>
<b>Technologies</b>	<ul style="list-style-type: none"> <li>VSAT, microwave, Wi-Fi, Dial up, Wi-max, DSL<sup>1</sup></li> </ul>
<b>Industry Revenue</b>	<ul style="list-style-type: none"> <li>\$90 million (\$45 million for internet, and est. \$40 to \$50 for leased circuits)</li> </ul>
<b>Industry Profit Level</b>	<ul style="list-style-type: none"> <li>Highly variable and significant decrease since 2010</li> <li>\$6 million</li> </ul>
<b>Job Creation</b>	<ul style="list-style-type: none"> <li>2,500 direct jobs created (50 employees per company on average)</li> <li>5,000 indirect jobs (NISPA estimates)</li> </ul>
<b>Monthly Salary Range</b>	<ul style="list-style-type: none"> <li>\$500-900 for a junior technician</li> <li>\$1,000-2,000 for a senior technician</li> </ul>
<b>Regulations</b>	<ul style="list-style-type: none"> <li>Registration with ATRA, ISP license fee</li> <li>Telecommunications and Internet Policy<sup>2</sup> (2003)</li> <li>Open Access Policy (2012)</li> <li>Taxes: 10% of revenues</li> </ul>

After years of expansion, ISPs are facing structural changes and the sector is likely to considerably decrease in size, in number of significant players and in revenue (if we exclude Mobile Broadband revenue). From 2002 to 2007, ISPs primarily relied on revenues based on satellite-based Very Small Aperture Terminal (VSAT) connections, principally due to the lack of physical infrastructure. Yet, since the activation of the fiber optic backbone (see p. 43), Afghan Telecom has become the largest ISP in the country. Not only is the state-owned company a wholesaler to the ISPs, but also serves as competition selling (directly or through a joint-venture with INSTA telecom) internet access to individuals and organizations. In the meantime, some of the ISPs' highest grossing clients, the military and a number of foreign organizations, are withdrawing from Afghanistan and internet penetration at home across Afghanistan remains structurally low. As such, the future outlook for many ISPs is somewhat troublesome.

### 3.2.2 ASSESSMENT OF THE ISP SECTOR

#### IMPACT

ISPs have nearly 10 years of experience operating in Afghanistan, focusing on the public and corporate sectors, and they have connected numerous firms, NGOs and government offices to the Internet. For instance, the ISP Neda Telecommunications is in charge of providing internet to the MoF and its provincial directorates. ISPs have developed solid networks across the country and understand the local context. In more recent years, in particular thanks to more affordable bandwidth, ISPs have started serving residential areas, and the estimated number of internet users in the country has reached 3 million.

Over the years, ISPs have contributed to the creation of nearly 2,500 direct jobs and 5,000 indirect jobs (NISPA estimates). These positions are usually well paid and ISPs provide their employees with regular training (network installation, maintenance, etc.). For example, the CEO

<sup>1</sup> MCIT issued Wi-Max licenses to two ISPs, Neda and Io Global.

<sup>2</sup> Source: MCIT, [http://mcit.gov.af/Content/files/AfghanistanTelecomPolicy\\_English29112010235311722.pdf](http://mcit.gov.af/Content/files/AfghanistanTelecomPolicy_English29112010235311722.pdf)

of New Dunia, an ISP based in Kabul, explained that his staff has grown with the company and is now much more technically advanced.

#### Case Study 5: ASIX, ISP in Kabul

##### ASIX – A successful local ISP in a Challenging Market

Founded in 2008, ASIX presents itself as “the premium provider of internet, communication, and track & trace services across Afghanistan”. ASIX has successfully diversified its services by investing in new technologies. The company offers GSM backhauling services, wireless connectivity, international private lease circuit services, mobile VSAT connectivity, and satellite tracking services. ASIX generated over 100 million Afs in revenue (\$1.77 million) in 2012, but was only able to accrue 5.8 million Afs (approximately \$103,000) in profits. The company claims low profit margins are due to investments made in new technologies (i.e. teleport technology). ASIX employs 90 staff members spread across all 34 provinces, the bulk of which work in their three offices (Kabul, Mazar-e-Sharif, and Herat). The salary range for skilled local staff is \$350 per month for an entry-level position and \$3,500 per month for the most senior professionals.



Despite success, the company is forecasting a 40% drop in revenue in 2013, but that business will stabilize and then experience growth in 2015 and beyond. The departure of much of the international community will hurt business, as nearly 95% of their clients are international organizations and NGOs. Moreover, business is suffering from the presence of illegal ISPs, Afghan Telecom's presence as a competitor with a monopoly on the fiber optic cable, a decrease in VSAT connections, and high taxes imposed by the GIRoA (ASIX paid approximately \$140,000 in taxes 2012). For the first time in the company's 5-year history, it will slash jobs starting in January 2014.

## REVENUE ESTIMATES

Without figures from ATRA or from the MoF, revenue estimates are very uncertain, but we can reconstruct them from a small number of figures and assumptions.

Afghan Telecom sells in excess of 10 Gbps<sup>1</sup> of bandwidth, about half of which sold to corporate clients in the form of dedicated bandwidth at a cost of \$170 per Mbps per month. This would represent a revenue of \$10.5 million in 2013.

The other half of Afghan Telecom's bandwidth is sold (partly through 26 other ISPs) to individual customers, at a final retail price and sharing ratios, which may vary significantly. Taking Afghan Telecom's retail price of \$86 / Mbps with a shared ratio of 1:3, we could assume a rough pricing equivalent of \$260 to \$280 per Mbps with a 1:1 ratio. Taking the latter, this would lead to total revenue (including resellers' margins) of approximately \$17 million in 2013 for the shared bandwidth Afghan Telecom provides.

The market share that this total bandwidth represents is difficult to evaluate, but the four main mobile network operators each have a maximum of one STM16, so about 10 Gbps maximum, but the largest part is most certainly used for their own traffic. Adding VSAT providers (whose market share and revenues are decreasing rapidly since the introduction of DSL), we would be looking at a market share of 70% for Afghan Telecom in terms of bandwidth used. However, evidence suggests that VSAT and wireless connections are sold at much higher costs. So, we can estimate at a market share of Afghan Telecom in terms of revenue of 60% to 65%.

<sup>1</sup> Figures in the next paragraph come from interviews with S.M. Asgar, CMO of Afghan Telecom, December 2013.

These assumptions suggest overall revenue for the sector of approximately \$45 million for 2013. In a 2007 study<sup>1</sup>, total revenue for the sector was estimated at approximately \$80 million, the main part of it through US Army and NATO contracts with foreign ISPs, (hence not part of national GDP). The \$45 million estimate is, by contrast, purely domestic revenue. To this revenue should be added an estimated \$40 to \$50 million<sup>2</sup> for leased circuits, i.e. parts of the optical fiber infrastructure that is leased to NATO and telecommunication operators for their domestic (and to some extent international) communication needs.

## CHALLENGES

For the past few years, the majority of ISPs have experienced a significant decline in their revenues and profit margins. VSAT connections, previously at the core of the ISP business, are being replaced by cheaper services thanks to the roll-out of Afghan Telecom's fiber optic cable ring. For a large ISP such as Multinet, this has resulted in a loss of nearly 75% of its VSAT business in only two years. As a representative of another ISP based in Kabul poignantly stated: *"The golden period for ISPs only lasted from 2004 to 2008."*

All the ISPs interviewed were also concerned about the withdrawal of international forces, and the potential departure of their main customers, international NGOs and companies, the United Nations agencies and foreign embassies. According to NISPAA, international clients represent nearly 70% of the ISP business and so their departure would considerably harm the sector.

### Case Study 6: New Dunia, ISP in Kabul

#### New Dunia – In crisis due to the departure of international organizations

New Dunia, an ISP in Kabul, has lost nearly 85% of its revenues since 2010, allegedly due to the departure of international organizations, but most probably to cheaper DSL services. Created in 2004, the company used to be one of the largest ISPs. In the last year only, the ISP's revenues decreased by 35%. New Dunia's CEO, Jamal Noorzai, is skeptical about the capacity of the sector to bounce back and he is thinking about closing his business after 2014. New Dunia's inability to foresee a decrease in demand for VSAT as well as its inability to diversify services have greatly contributed to its downfall.



In addition, ISPs are exposed to unfair competition. NISPAA estimates that there are 70 to 80 illegal ISPs. They offer cheaper services because they do not pay license fees or taxes. ATRA has strengthened its capacity and sometimes fines illegal companies, but ISPs insist that further control is necessary.

According to several interviewees, this black market is partly due to the heavy tax burden on ISPs. Companies have to pay taxes equal to 10% of their revenues, the same rate as telecommunications companies, whereas they are not allowed to offer voice services and their revenues are not as substantial as the telecommunication firms'. ISPs complain that this tax policy is unfair and encourages the creation of illegal ISPs.

ISPs have to cover increasing operating costs due to insecurity. In some areas in the South and the East, companies are even forced to end their activities. A representative of Multinet, an ISP based in Kabul, explained that the security situation has deteriorated to the extent that in some provinces like Nangarhar, his company is losing money.

<sup>1</sup> Altai Consulting, ICT sector assessment for CDP Program, 2007.

<sup>2</sup> Source: private communication with telecom experts. No clear data could be obtained from Afghan Telecom.

The main difficulty for the sector will be to clarify the status of Afghan Telecom. The state-owned company now competes with ISPs as a retail seller and its prices are the lowest of the market. “*To compete with them is very difficult*,” said a representative of a Kabul-based ISP. Another ISP in Kabul, also deplored the bias for Afghan Telecom in all public markets. A key regulatory challenge, as highlighted by many ISPs, is Afghan Telecom’s monopoly over the fiber optic cable, an infrastructure built thanks to international and public funding, and they request that the state-owned company limits itself to a status of wholesaler.

Finally, ISPs worry about the development of 3G. Although 3G still has a limited reach, it has the potential to quickly expand and turn into a serious competitor for ISPs. It is particularly the case for smaller companies that often prefer to use a 3G connection, instead of setting up a whole network at their office.

## FUTURE OUTLOOK

Initially a market focused on providing large organizations with profitable *ad hoc* solutions, providing internet access in Afghanistan has stated to change in nature since 2010. Internet users are estimated to have increased from 2,000 in 2004<sup>1</sup> to more than 3 million in 2013<sup>2</sup>. This expansion is expected to continue with further progress in education and a greater awareness about IT. In the future, the market will most probably become focused essentially on residential broadband and mobile data usage. The consolidation of operators, already started, is likely to continue, with Afghan Telecom and mobile network operators taking a more important role in the market. Concurrently, bandwidth price will probably continue to decrease, converging towards values observed in the region.

To maintain their level of activity, ISPs have started to diversify their client base and they will develop further services tailored to the local market. For instance, Easy Connect, an ISP based in Kabul, is targeting local businesses in order to establish a more sustainable client base. The company also plans on hiring IT specialists and developing a solid IT services department. These comprehensive IT services are likely to become more popular over the next few years.

## 3.3 TELECOMMUNICATIONS INFRASTRUCTURE

### 3.3.1 OVERVIEW

Table 4: Key Facts and Figures of the Installation Telecommunications Systems Companies

Key players	<ul style="list-style-type: none"> <li>Chinese firms: ZTE and Huawei</li> <li>Western firms: Ericsson, Alcatel-Lucent, Nokia-Siemens</li> <li>Local firms working as contractors for the larger ones</li> </ul>
Services	<ul style="list-style-type: none"> <li>BTS, BSS, NSS, solar systems, networking, etc.</li> </ul>
Sector Revenue	<ul style="list-style-type: none"> <li>Average \$190 million in the last 5 years, \$130 million in 2013</li> </ul>
Job Creation	<ul style="list-style-type: none"> <li>1,500</li> </ul>
Monthly Salary Range	<ul style="list-style-type: none"> <li>\$500-900</li> </ul>
Regulations	<ul style="list-style-type: none"> <li>Registration with AISA</li> </ul>

Companies working on the deployment and installation of telecommunications systems have played a tremendous role in building a solid network across the country. However, the largest

<sup>1</sup> Source: MCIT.

<sup>2</sup> Hamdard, J., “*The State of Telecoms and Internet in Afghanistan at a Glance*”, Discourse, PSN:A0013, August 2013.



firms (Ericsson, Nokia-Siemens, and Alcatel-Lucent) are currently scaling down their activities. Only the two Chinese firms, Huawei and ZTE, have expanded and they now work with the six operators, including Afghan Telecom. They operate at a lower price and so they have won a number of contracts over Western companies.

### 3.3.2 SECTOR REVENUE

The sector revenue has been, and is still driven by MNOs' need for infrastructure building and maintenance. Total investment in telecommunication network and equipment since 2002 is reported by MCIT to be \$2.07 billion (about 30% of cumulated operators' revenues)<sup>1</sup>. This investment allowed the creation of a very extensive network of more than 5,200 base stations (as of March 2013), covering 88% of the population in and providing voice and data interconnection to neighboring countries.

GIRoA projects are another area of investment in infrastructure. However, MCIT's figure is likely to include at least part of these investments into Afghan Telecom's investment (more particularly for 2013, the optical fiber backbone, entirely operated by Afghan Telecom).

Table 5: Main Infrastructure Projects

Main Projects	Duration	Budget
Optic Fiber Cable (OFC) <sup>2</sup>	2006-2016	\$130 million, WB, GIRoA
District Communication Network (DCN) <sup>3</sup>	2005-2006	\$14.2 million, USAID
Government Communication Network (GCN) <sup>4</sup>	2004-2006	\$15.74 million, WB
Expansion of GCN and Village Communication Network <sup>5</sup>	2007-2008	\$6 million, GIRoA
Expansion of the National Digital Telephone Network <sup>6</sup>	2007-2008	\$50.8 million, GIRoA
TDF Projects	Ongoing	Numerous projects (non-exhaustive): Construction of BTS in rural areas (\$28 million, starting in 2012); Cooperation with MoPH (internet access for hospitals and health centers, \$4 million, 2012-2015), MoE and the Ministry of Higher Education (enhance access to IT in secondary schools and universities, \$2 million, starting in 2013), TDF

### NATIONAL FIBER OPTICS INFRASTRUCTURE

The most ambitious public infrastructure project and the one with the most potential impact is the National Optical Fiber Cable (OFC) project. It aims at building an optical fiber ring around Afghanistan and interconnections to neighboring countries. The first phase included 3,200 km of cable, extended to over 5,000km in subsequent phases<sup>7</sup>. The total estimated budget for the project is \$130 million funded by the World Bank and the Afghan Government. The first phase is implemented by the Chinese company ZTE. There are multiple contracts in place for the

<sup>1</sup> This figure probably includes MNOs license fees (\$165 million to date), which should be removed from this sector's revenue.

<sup>2</sup> Source: Hamdard, 2013.

<sup>3</sup> Source: [MCIT](#)

<sup>4</sup> Source: [MCIT](#)

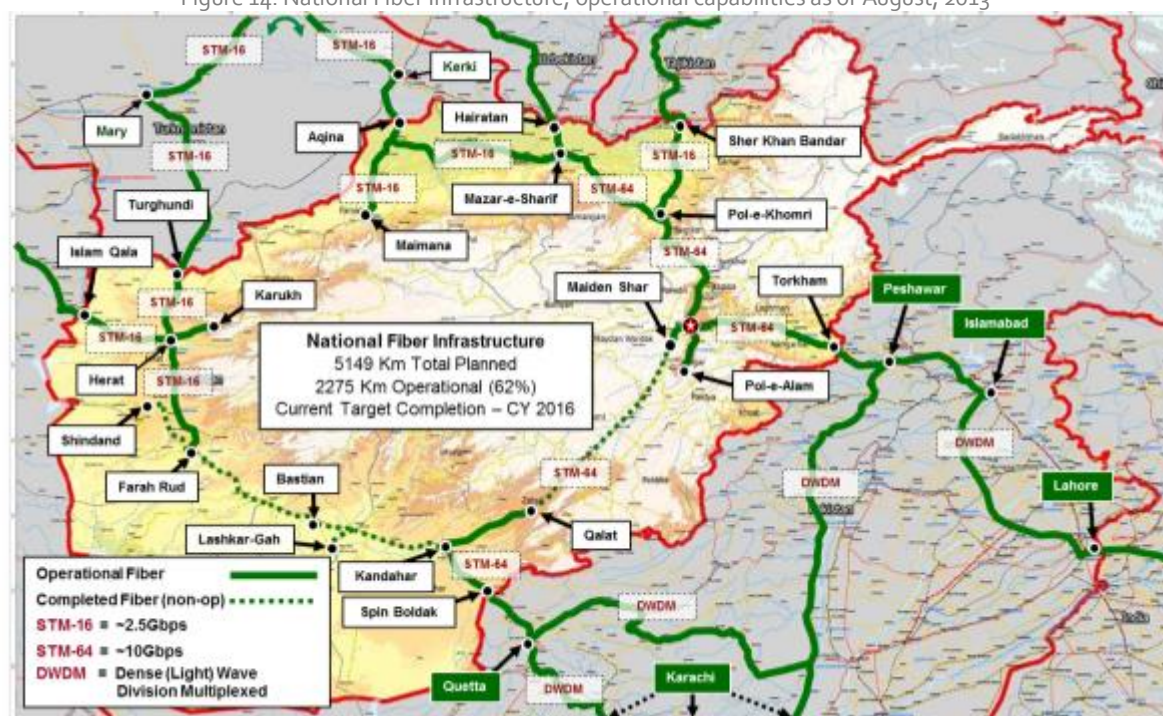
<sup>5</sup> Source: [MCIT](#)

<sup>6</sup> Source: ATRA.

<sup>7</sup> The current project is scheduled to be completed in 2016.

completion of the second phase over the next two or three years. It is likely that this national network will keep growing beyond current plans.

Figure 14: National Fiber Infrastructure, operational capabilities as of August, 2013



Source: Deloitte/Telecom Advisory Team, December 2013

To date, the interconnection capacity with neighboring countries is (Afghan side) – two STM-64 links to Pakistan (Torkham and Spin Boldak), five STM-16 links to Iran (Islam Qala), Turkmenistan (Turghundi and Aquina), Uzbekistan (Islam Qala), Tajikistan (Sher Khan Bandar). This would be roughly equivalent to 32 Gbps. However, nearly all traffic is routed through Pakistan to undersea cables in Karachi. Pakistan provides much cheaper rates than other neighboring countries<sup>1</sup>. The Turkmenistan links are used as a bypass for the yet-to-be-constructed route between Maimana and Karukh. Other routes (Iran, Uzbekistan, Tajikistan) routes are used only for backup/redundancy. Afghan Telecom, the operator of the OFC, is currently in discussion to bring traffic from the Trans-Siberian Fiber in Kazakhstan through Turkmenistan for redundancy purposes as well.

The Telecom Advisory Team (TAT) highlights the potential of the Afghan fiber infrastructure for international transit traffic: Afghanistan is ideally placed between continental (Trans-Siberian Fiber and Trans-Asia/Europe fiber) and undersea cables along South-Asia. The TAT gives the example of Iraq: in a similar geographic situation, transit traffic through Iraq reportedly represents an income of \$24 million per month.

When asked whether such discussions/negotiations had been initiated, Afghan Telecom answered that Afghanistan's neighbors would indeed find a cheaper transit through Afghanistan, but doubted these countries would trust Afghanistan to carry potentially sensitive traffic.

Furthermore, it is unlikely that Afghanistan could provide in the near future the required quality of service to fulfill typical service level agreements (SLA) for this kind of service.

<sup>1</sup> According to Afghan Telecom, Uzbekistan prices are three times as high as Pakistan.

While parts of the fiber optics infrastructure are operational and already provide a much cheaper and more consistent connection to the Internet than ever, the ring topology is not complete, making the infrastructure very prone to attacks and disruptions. Until sufficient redundancy and capacity to recover rapidly from disruption are built in the capability of its operator, it is unlikely that neighbors will rely significantly on it for their connection to the Internet.

### 3.3.3 OUTLOOK

The sector has been extremely active in the past 12 years in rapidly building infrastructure for six mobile telecommunication networks and a large internet backbone. While there is still work to be done, Afghanistan has completed most of its large-scale projects. MNOs have almost completed their BTS networks and more than 60% of the fiber optic cable has been built, although not all parts of it are yet operational. On the MNOs side, maintenance and equipment of the networks in 3G and later technologies will keep generating substantial revenues to the equipment sector. However (as discussed above), MNOs' own outlook makes it unlikely that they will risk as large an investment as in the past 12 years.

With fewer projects, infrastructure companies are operating with less staff. For instance, Alcatel-Lucent employed until recently 60 to 70 people, whereas its office now has only 2 people. Companies are also reducing their presence because security conditions make operations more difficult. A representative of Alcatel-Lucent thus explained that foreign staff were reluctant to come to Afghanistan. They are now thinking about closing their office after 2014.

On the contrary, the Chinese companies Huawei and ZTE have grown on the Afghan market. ZTE shared that their revenues have increased by 10% to 20% every year since they opened their first office in 2002. ZTE is working with Afghan Telecom on the optic fiber, but also with the other telecommunication companies on infrastructure projects. For instance, ZTE collaborated with Etisalat on the launch of 3G. The firm employs up to 300 people and its staff increases every year. Among them, 20 are Chinese whereas 280 are Afghans. Salaries range between \$100 and \$2,000 per month.

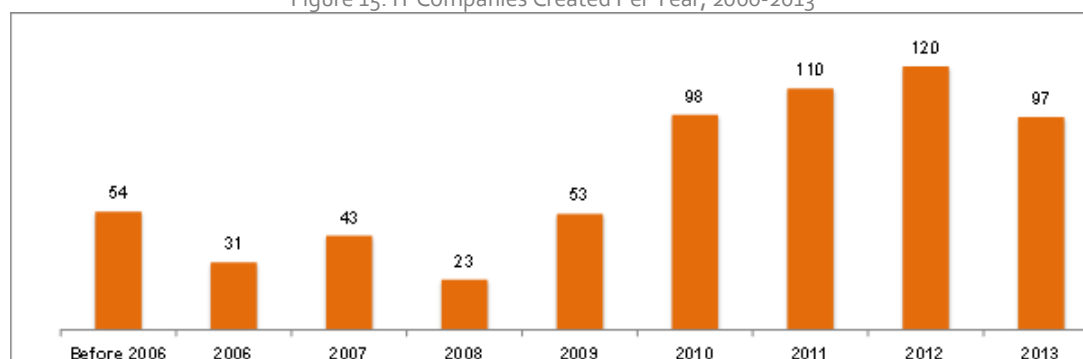
## 3.4 IT SERVICES

### 3.4.1 OVERVIEW

Table 6: Key Facts and Figures of the IT Services Industry

<b>Key players</b>	<ul style="list-style-type: none"> <li>• 619 IT companies registered with AISA</li> <li>• 60-120 IT companies unregistered</li> <li>• Key players in Kabul: NetLinks, TechSharks, TechNation, First Rate, ARTS</li> <li>• Emergence of the IT sector in the main cities: Herat (28), Mazar-e-Sharif (14), Jalalabad (10)</li> </ul>
<b>Services</b>	<ul style="list-style-type: none"> <li>• Web designing, web hosting, e-mail hosting</li> <li>• Data base and software development</li> <li>• IT Consulting</li> </ul>
<b>Industry Revenue</b>	<ul style="list-style-type: none"> <li>• \$50 million</li> </ul>
<b>Industry Profit Level (yearly)</b>	<ul style="list-style-type: none"> <li>• Highly variable: \$100,000-500,000 for the largest firms in Kabul, \$10,000-40,000 for the IT companies in the provinces<sup>1</sup></li> <li>• Total: \$14 million</li> </ul>
<b>Job Creation</b>	<ul style="list-style-type: none"> <li>• 2 to 25 people per company, average of 6</li> <li>• 3,700</li> </ul>
<b>Monthly salary Range</b>	<ul style="list-style-type: none"> <li>• Up to \$2,500 for the partners of the largest IT firms</li> <li>• \$500-1,000</li> </ul>

IT companies have undergone rapid growth in the last years, and currently more than 600 companies are registered in Afghanistan<sup>2</sup>. As illustrated in the figure below, IT firms established since 2010 represent more than 60% of the sector. Most of these firms are located in Kabul (around 550<sup>3</sup>), but a few operate outside of the capital, mainly in Herat and Mazar-e-Sharif.

Figure 15: IT Companies Created Per Year, 2000-2013<sup>4</sup>

Source: AISA

<sup>1</sup> Based on interviews with IT firms in Kabul, Herat, Mazar-e-Sharif and Kandahar.

<sup>2</sup> AISA. In this section, IT companies refer to companies that register with AISA under the following activity description: "ICT solution", "Computer services (IT solution)", "Web designing and web hosting" and "Designing and network".

<sup>3</sup> Source: AISA.

<sup>4</sup> Source: AISA.

### 3.4.2 ASSESSMENT OF IT COMPANIES

#### STRENGTHS

The dynamism of the sector is essentially due to a few young entrepreneurs. Most of them just graduated from university, do not have previous work experience, are very creative, and develop innovative software or applications. For instance, Microcis, an IT company in Herat, designed *"Concours"*, a program to prepare students for the university entrance exam. These businessmen are very ambitious and motivated to develop the sector. *"I want to be the one to launch revolutionary products,"* claimed Farzad Wahabzad, the CEO of 4sat, an IT firm in Herat.

IT companies have also benefited from a growing demand in IT services. In Kabul, most medium to large companies already use IT: they have a website for advertisement and rely on accounting and management software. IT firms are concentrated in Kabul, but the sector has started to emerge in provincial capitals. In Herat, an increasing number of local firms ask for IT support, and they slowly acknowledge the utility of new technologies for higher productivity and transparency. The figure below summarizes the state of the sector.



Case Study 7: 4sat, IT Company in Herat

#### 4sat – A dynamic IT player in the Herati Market

Farzad Wahabzad, 22, is still a student at Herat Computer Science Faculty but he has been working for his company, 4sat, for the past three years. 4sat has expanded principally thanks to services to Herati companies, and it does not depend on international clients. Farzad explains that IT education remains limited among local businessmen, but his company regularly meets with firms and shows them how ICT can benefit to their activities. 4sat has regularly grown since its creation (+10% per year) and its local anchorage is an asset as some foreign organizations are leaving. The CEO Farzad Wahabzad is creative and willing to prove himself as an entrepreneur.



In a few years, the IT sector has become increasingly competitive in Herat and a number of alumni from the Herat Computer Science Faculty started their own company. Compared to Kabul IT firms, their services are basic but companies like 4sat expect not only a growth in demand in the near term, but also to have to serve more sophisticated needs of local businesses in the near term.

Finally, the IT sector has benefited from significant support from international donors, willing to foster innovation and entrepreneurship. For instance, Raha Consulting and Technology in Mazar-e-Sharif received support from G-peace, a program designed to enhance business in war-torn areas. In Herat, Afghan Citadel and 4sat were part of a US Department of Defense sponsored incubator and they received business development consulting from international firms like IBM



and Microsoft. Further, the Innovation Support Program, started in April 2013, will support the application economy with a \$5 million grant program.

### CHALLENGES

The main weakness of IT companies is the lack of a business strategy. IT graduates have little knowledge of the private sector, and they often do not plan their development. *"Many young IT companies fail for lack of basic accounting and marketing skills,"* explained the founder of 4sat.

In addition, IT companies complain that they face unfair competition from firms that are not registered with AISA, that do not pay taxes and that offer services at a lower price.

Last, the devaluation of the Afghani raises difficulties for IT companies. Revenues are in Afghani but companies have to buy equipment in foreign currencies as equipment has to be imported. As a result, a firm like Netlinks in Kabul is losing money because of the worsening exchange rate.

### FUTURE OUTLOOK

Public and private entities constitute a large potential market for IT companies. Many still have to move from a paper-based system to computerized mechanisms (see Section 4). They need databases and software, especially for management information systems. The Afghan government still demands these services and represents the main source of revenue for IT firms like Netlinks and First Rate in Kabul.

The sector will also progress thanks to a better-trained workforce. IT education has tremendously improved and recruiting developers has become much easier. Computer Science Faculties and Departments have opened (or re-opened) and they participate to the dynamism of the sector.

IT companies are also creating new business opportunities by offering more complex corporate services. With the expansion of the sector, many small firms now offer basic services (website development, web hosting, e-mail hosting, etc.) for decreasing prices. A website that cost around \$1,700 a few years ago can now be designed for nearly \$300. As a result, the most experienced companies are repositioning themselves on more complex and expensive services: IT consulting, enterprise solutions, etc. Moreover, an opportunity exists to be first movers in designing mobile applications focused on local content, in local languages, and specifically for the growing number of Afghan smartphone and 3G users.

#### Case Study 8: Netlinks, IT Company in Kabul

##### Netlinks – IT company moving to more sophisticated services

By its longevity and capacity to innovate, Netlinks is a pioneer in the IT sector. Founded in 2006, the company has established itself as a high-end IT services provider. Netlinks started with a limited number of basic services (website designing, web hosting, and database management) but has developed a wider portfolio of activities. The company is shifting towards more complex products as it acknowledges that the market has changed. Enterprise solutions (accounting and finance solutions, ICT consulting services, etc.) now account for 50% of Netlinks's revenues. Farshid Ghyasi, Netlinks CEO, is confident that his business will continue to grow in the next years and the company plans to focus on advanced IT solutions.



## Case Study 9: Paywast News Mobile Application

**Paywast News – The First Smartphone-based News Application in Afghanistan**

Since November 2013, Afghans have had access to daily national and international news on their smart phones. The android-based application, a joint venture between Paywast Khaam Press and Wadsam News, provides access to daily political, economic, social, and sports news to an estimated 800,000 smartphone users in Afghanistan. The news items are available in Dari as well as English.

Jes Kaliebe Petersen, Director of Development for Paywast, stated “We are excited to launch the Paywast News app, because it has the potential to have a direct impact on how modern Afghans get their information, and provides a steady stream of relevant updates and current affairs. Paywast News is our first smartphone app and it is available in the iTunes and Google Play app stores.”

It is expected that locally created mobile applications will become more common, as IT service providers and tech savvy entrepreneurs look to be some of the first entrants into the mobile app business.

Although no IT law has been passed, MCIT is currently designing a strategy and regulations for the sector. IT actors reportedly have mixed views on this initiative. On the one hand, some expressed reluctance to establish new rules. “*It could ruin the creativity of the sector,*” said the director of an IT company in Kabul. On the other hand, all agree on the opportunity to design a clear framework for IT activities, and curb unfair competition from illegal IT firms.

Last, most of the firms encountered were concerned about 2014, and how political and military decisions might affect the economy. Already in 2013, some lost their international clients and their largest Afghan customers have reduced their IT spending because they could not afford it. It remains to be seen to what extent the departure of international donors will impact the sector.

## 3.5 HARDWARE DISTRIBUTION

### 3.5.1 OVERVIEW

Table 7: Key Facts and Figures of the Hardware Industry

<b>Key players</b>	<ul style="list-style-type: none"> <li>4,500 mobile shops<sup>1</sup>: 2,000 in Kabul, 350 in Herat, 250 in Jalalabad, 550 in Kandahar, 300 in Mazar-e-Sharif, less than 40 in Kunduz, less than 25 in Pul-e-khumri</li> <li>1,000 computer shops: 400 in Kabul, 200 in Herat, 100 in Jalalabad, 100 in Kandahar, 150 in Mazar-e-Sharif, less than 10 in Pul-e-khumri and Kunduz</li> </ul>
<b>Services</b>	<ul style="list-style-type: none"> <li>Selling new and second-hand items</li> <li>Maintenance of goods</li> </ul>
<b>Industry Revenue</b>	<ul style="list-style-type: none"> <li>\$250 million</li> </ul>
<b>Job Creation</b>	<ul style="list-style-type: none"> <li>15,000 (2-5 people per shop)</li> </ul>
<b>Monthly Salary Range</b>	<ul style="list-style-type: none"> <li>\$500-900</li> </ul>
<b>Regulations</b>	<ul style="list-style-type: none"> <li>Registration with the municipality (2,000 Afs, around \$34)</li> </ul>

Hardware distributors have blossomed in recent years, in the main urban centers but also in smaller towns like Kunduz and Pul-e-Khumri. The sector is divided into two sub sectors, telephony (basic cell phones to smartphones) and IT equipment (computers, prints and scanners). Hardware shops are usually family business, with two to five employees.

<sup>1</sup> Estimate. Most, but not all shops distributing mobile credit sell handsets



### 3.5.2 ASSESSMENT OF THE HARDWARE SECTOR

#### ESTIMATED REVENUE

In the absence of credible import figures, we can evaluate the number of mobile phones sold per year by assuming that one phone is bought by each new subscriber (circa 850,000 in 2013<sup>1</sup>) and that a mobile phone is renewed every 5 years.

A basic mobile phone costs approximately \$10. More advanced and costly phones have become gradually more popular since 2002, and operators estimate that nowadays, about 8% of their user base is equipped with a smartphone<sup>2</sup>. A basic Android enabled phone costs an average of \$100.

Under these assumptions, the total revenue for mobile phones distribution would represent \$80 million in 2013. This estimate is considered to be at the low-end, as it does not take into consideration consumers that are able to afford expensive smart phones. However, those individuals represent a small fraction of mobile phone purchasers.

Research suggests there are approximately 1,000 computer shops across the country, in comparison to 200 in 2007. The large majority of computer shops can be found in large specific markets, dedicated to the sales of computers, printers, and computer related accessories. In Herat, for example, Fahim Market has approximately 150 individual shops competing for business. Given greater competition, only an estimated 10% are considered big players, and are able to make substantial revenues. Research with large players suggests they make an average revenue of \$50,000 per month, or \$600,000 per year, from sales to final customers. As such, revenue for large players is estimated to be \$60 million in 2013. Medium players in the market represent an estimated 20% of total shops, and interviews with key informants suggest that each medium player earns an average of \$20,000 in revenues per month, or \$240,000 per year. The total revenues generated from medium market players can thus be estimated to be \$48 million. Finally, small market players represent an estimated 70% of total shops. Small computer shop store owners interviewed report an average revenue of \$8,000 per month, or \$96,000 per annum. Therefore, small players would represent an estimated \$67 million in total revenue. The entire hardware market is worth an estimated \$175 million.

By comparison, there are an estimated 2.4 million internet users, with an additional 400,000 this year. If we take new additional internet users as a proxy for computers sold, the above figure of \$175 million translates into an average cost for a computer and related equipment of \$440, which is consistent with what was observed in visited computer shops (an entry-level desktop computer would cost about \$300 and a mid-range laptop between \$600 and \$800).

When adding mobile phone shop and computer shop revenues, the total revenue for the hardware industry is estimated to be just over \$250 million. This does not account for specialized telecommunication equipment, included in the telecommunications systems section.

#### STRENGTHS

Hardware shops have benefited from a sustained growth in demand in the last years. The expansion of cell phone resellers has followed the boom in the number of cell phone subscribers. *"Everybody needs a phone now"*, said Mohammad, a cell phone reseller in Kabul. In

<sup>1</sup> We take the number of new unique subscribers, not subscriptions, to keep the sector revenue estimate conservative. A number of existing subscribers will purchase a new SIM card simply to benefit from a promotion.

<sup>2</sup> Source: Key informant interviews with MNOs

the meantime, better access to electricity and fixed broadband has had a positive impact on IT equipment sales for both private and corporate markets, and international donors, governments and companies frequently bought equipment from computer shops, for their own staff or projects they funded.

Over the years, resellers have established reliable networks of distribution. Resellers in Kabul import hardware from Dubai, Pakistan and India. In Kabul, computer shops sell their products to resellers from the provinces. For instance, Ikramullah, owner of a computer shop in Kabul, shared that his largest clients were computer shops from Bamyan, Takhar, Mazar-e-Sharif and Kunduz (25% to 30% of Ikramullah's revenues).

#### Case Study 10: Mohammad Cell phone Shop, in Kabul

##### Mohammad Cell phone Shop – Dynamic smartphone market in Kabul

Mohammad opened his shop in 2004. Cell phones were very basic at the time, and Mohammad reminds how they became more popular as more people got used to make phone calls. His business has regularly increased since 2004.

Over the last two years, Mohammad has observed how smartphones have become trendier in Kabul. In the last year, three models of smartphone accounted for nearly 60% of his sales. *"People now use the Internet on their smartphone, and our business is increasing,"* he summarized.

Mohammad earns a profit of approximately \$14,000 every year, a comfortable profit for a mobile phone dealer.



Picture 1: Mohammad Cell Phone Shop, Kabul

## CHALLENGES

Employees in hardware shops rarely have any background in ICT. They limit their services to sales whereas they could offer complementary services, repair equipment and create customer loyalty.

Second, hardware companies are usually small familial companies and so they do not keep standard accounts of their revenues. This prevents them from precisely assessing their costs and developing a strategy to maximize their profits.

## FUTURE OUTLOOK

As shown in the next case study, the cell phone market is increasingly dynamic, in particular for smartphones. Computer and cell phone resellers have also extended their product range and they now sell additional items: scanners, printing services but also computer covers and mouse pads. The accessories market is likely to further expand in the next years as competitors look to diversify product offerings in order to differentiate themselves. In regards to computer sales, however, shop owners expect a decrease in total sales. Due to a substantial increase in competition over the past few years, a majority of computer shop owners report a dramatic decrease in sales in 2013. Small shop owners suggest there are only a few large players that can make substantial revenue in each large urban market. Considering increased competition coupled with a decrease in large buyers such as international organizations, the majority of interviewees suggest the future does not look as profitable as the past. The case study below

presents the story of a reseller who opened his shop just before the closure of the Kunduz Provincial Reconstruction Team (PRT) and now suffers the consequences of the economic crisis.

Case Study 11: Nawie Nalege Computer Shop, in Kunduz

**Nawie Nalege Computer Shop – Crisis on the Computer Market after the Closure of Kunduz PRT**

Abdul Qadir opened his computer shop a year ago in Kunduz, and he benefited from the presence of international NGOs, the PRT and companies working for international troops. He previously worked for another computer shop for 11 years, but the sector appeared so promising that he decided to start his own business.

During the first year, Qadir was selling 7 to 9 computers a day (average profit of \$50 per computer). The PRT was the shop's main client, and the military was buying 50 to 60 computers a month – mainly for translators. The shop quickly grew, and Qadir got more stocks.



Picture 2: Nawie Nalege Computer Shop, Kunduz

However, after the closure of the PRT in October 2013, many organizations and companies left Kunduz, security deteriorated and Qadir saw his business rapidly declining. *"In 2013, we don't have any more clients,"* he laments. He sells one computer a day, the good days.

After a prosperous first year, Qadir has seen his profits decrease by nearly 70% and he worries that his business will further deteriorate.

Despite this negative perspective, the number of computer users is expected to grow steadily in the next few years, as will the number of internet users. The market is already shifting from a profitable one targeting large organizations to a more competitive one with a much larger user base.

## 3.6 IT TRAINING CENTERS

### 3.6.1 OVERVIEW

Table 8: Key Facts and Figures of IT Training Centers

Key players	<ul style="list-style-type: none"> <li>250 IT training centers and institutes: approximately 100 in Kabul, 100 in Kandahar, Mazar-e-Sharif, Herat and Jalalabad, and 50 in the rest of the country</li> </ul>
Services	<ul style="list-style-type: none"> <li>IT Training centers: short-term courses on the basics of IT</li> <li>IT Institutes: 2 to 5 year programs, with more advanced courses and a diploma</li> </ul>
Industry Revenue	<ul style="list-style-type: none"> <li>\$25-30 million</li> </ul>
Industry Profit Level	<ul style="list-style-type: none"> <li>Highly variable: \$2,800 for Iqara training center in Kandahar, against \$70,000-80,000 for Rana Institute for Higher Technology in Kabul</li> <li>\$1.8 million for the sector</li> </ul>
Job Creation	<ul style="list-style-type: none"> <li>1,650 (7 to 10 teachers per IT training center)</li> </ul>
Monthly Salary Range	<ul style="list-style-type: none"> <li>\$500-900</li> </ul>
Regulations	<ul style="list-style-type: none"> <li>MoHE's certification to deliver official diploma</li> </ul>

With a rising demand for IT education, IT training centers and institutes<sup>1</sup> represent an emerging market in Afghanistan. IT training centers usually offer short-term training and target professionals willing to complete their education. On the contrary, IT institutes tend to target high school graduates, the programs are longer and students earn a diploma at the completion of their studies. Most of these IT education organizations teach both Computer Science and English, a requirement for students who use IT.

IT training centers and institutes are more common in cities where access to the Internet is normalized among young people and professionals. For instance, training centers have flourished in the more tech-savvy Herat than Kandahar where centers remain relatively scarce.

### 3.6.2 ASSESSMENT OF IT TRAINING CENTERS AND INSTITUTES

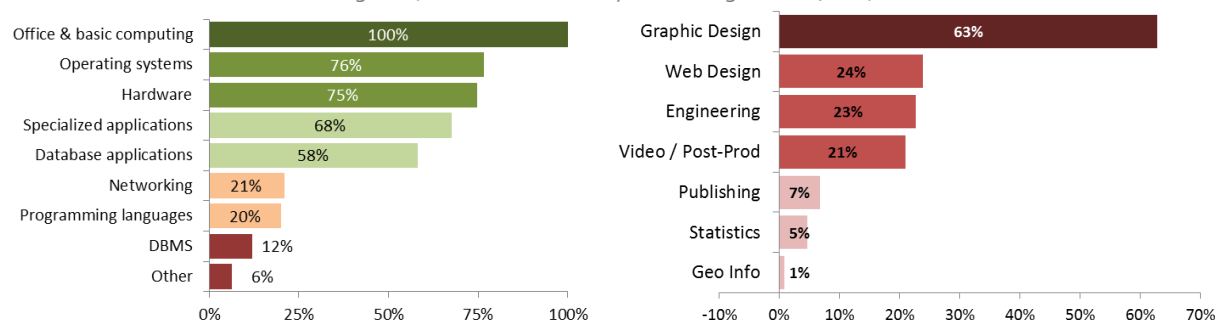
In 2007, a study<sup>2</sup> identified and interviewed 254 ICT training centers, two-thirds of which were attended by less than 300 students per year, only 1% delivered trainings to more than 1,800 students per year, and an average of about 500 students per year.

An entry-level training package to Office, Windows and basic hardware constituted at least 60% of the centers' activities, and 40% of the centers' offered only basic computing curricula. Among more specialized applications, graphic design packages, web design and MS Access were among the most demanded.

<sup>1</sup> In this section, training centers and institutes do not include public institutions or training centers supported by NGOs or the government.

<sup>2</sup> Altai Consulting for ABC program (USAID/Bearing Point), *ICT sector assessment*, Oct. 2007.

Figure 17: Services offered by IT Training Centers, 2007



Source: Altai Consulting analysis

Training centers declared an average revenue of \$38 per student. The study considered total revenue of \$5 million per year for the sector to be a conservative estimate.

Since then, our high-level assessment in 5 cities did not find a significant increase in the number of centers, but it is likely that a number of centers have grown to a larger level of activity, as shown by the average number of teachers they employ (3 in 2007, 7 to 10 in 2013). Teachers are also better paid now than they were in 2007 (\$500 to \$900/month, compared to an average \$135/month in 2007), suggesting they might work more hours per week (average was 17 in 2007).

Prices shown in Table 9 below do not seem to have increased by much, if the typical training package remains the same. HR costs are likely to represent the largest part of the costs, even more than in 2007 where energy was the second highest expense (most cities did not have consistent power then). HR costs alone suggest an increase in revenue by a factor of 4 to 5, bringing the total revenue to a (still conservative) estimate of \$25 million. Since the sector is fairly competitive, profit margins are quite low (less than 10%).

## STRENGTHS

The sector has experienced significant development in recent years. IT training centers and institutes have benefited from the general growth of private institutes, but this trend also denotes a sustained interest for IT. Students and professionals who invest in private IT courses hope that these will help them to get a better professional position and perhaps to work for an international organization, where salaries are higher. *"It is a competition between families, they all want to send their children to IT institutes,"* said the director of an IT training center in Jalalabad.

## CHALLENGES

Private institutes have mushroomed in the last 12 years but the MoHE does not recognize all of them. To deliver an official diploma, a private institute needs to be certified by MoHE. Some institutes play on the ambiguities, and give a "Diploma in IT" or "Bachelor in IT" to their students, without specifying that these diplomas are not legally valid (see case study below).

Students have no guarantee regarding the quality of the teaching, and they usually rely on the local reputation of the institution. Most of the courses offered by these centers are basic (Microsoft Office package, typing, etc.) but some offer more advanced classes in coding, programming and designing. As shown in Table 9, prices greatly vary among institutions, along with the curriculum of the programs.



Table 9: Training Centers, Prices<sup>1</sup>

Location	Average Price
Rana Institute, Kabul	<ul style="list-style-type: none"> <li>• <b>Diploma:</b> 2,500 Afs (\$44) per month for 8 months</li> <li>• <b>Bachelor:</b> 6,000 Afs (\$106) per month for 32 months</li> </ul>
Iqara Center, Kandahar	<ul style="list-style-type: none"> <li>• <b>MS Office:</b> 1 month for 500 Afs (\$9)</li> <li>• <b>Accounting:</b> 2 months for 18,000 Afs (\$318)</li> </ul>
Zia Institute, Jalalabad	<ul style="list-style-type: none"> <li>• <b>MS Office:</b> 5 months for 5,000 Afs (\$89)</li> <li>• <b>Installation:</b> 2 months for 2,000 Afs (\$35)</li> <li>• <b>Networking:</b> 2 months for 2,000 Afs (\$35)</li> </ul>
Helal Institute, Herat	<ul style="list-style-type: none"> <li>• <b>Short courses:</b> 700 Afs/month for 5 months or a year (\$12/month)</li> <li>• <b>Long term courses:</b> 4,000 Afs for entrance (\$70) and 12,000 Afs/semester (\$212) for 4 semesters</li> </ul>

All the directors of the IT centers encountered complained that they had difficulties recruiting qualified teachers. This issue is particularly acute in the provinces. As a result, directors have to hire foreign teachers. Their salary is at least three times higher than for an average Afghan professor, and so it constitutes a significant additional cost for the institutes.

### FUTURE OUTLOOK

Directors of IT training centers and institutes have noted a general slowdown in the number of applications in 2013. Due to the closure of PRTs and the departure of some international organizations, the resources of families directly or indirectly employed by these organizations are sometimes more limited and they cannot always afford IT courses. They also feel less compelled to have an IT training, once a necessary asset to get a job with an international organization. The case study below, Zia Institute of Computer Science, in Jalalabad, illustrates this trend. It remains to be seen whether this is a short-term crisis, or if IT institutes will have to adjust to a new economic environment.

Case Study 12: Zia Institute of Computer Science, in Jalalabad

#### Slowdown in Activities in 2013

Bakht Wali, the director of Zia Institute of Computer Science, observes that his business is facing difficulties, after years of expansion.

Zia Institute of Computer Sciences opened in 2007. It offers classes in English and Computer Sciences. The Institute quickly grew, from 250 students at the opening in 2007 to nearly 1,000 students in 2009 and 2010.

Bakht Wali intended to launch two diplomas, a Diploma in IT (DIT) and a Bachelor in Computer Science (BCS). However, the MoHE did not grant him the authorization. Zia Institute still advertises the diploma on their building.

Demand for IT training has overall increased in Jalalabad, but Bakht Wali complains that demand has drastically decreased in the last few months. He also notes that fewer girls are allowed to take classes at the institute. The current trend is very worrisome and Bakht Wali explained that the closure of the PRT had



Picture 3: Zia Institute of Computer Science

<sup>1</sup> Based on KIIs with these training centers and institutes in Herat, Kandahar, Jalalabad and Kabul.

had a negative impact on the local economy and that families could not pay for IT classes anymore.

## 3.7 INTERNET CAFÉS

### 3.7.1 OVERVIEW

Table 10: Key Facts and Figures of Internet Cafes

<b>Key players</b>	<ul style="list-style-type: none"> <li>400: around 130 in Kabul, 30 in Kandahar, 100 in Herat, nearly 60 in Mazar-e-Sharif, less than 20 in Jalalabad and less than 50 in the rest of the country</li> </ul>
<b>Services</b>	<ul style="list-style-type: none"> <li>Internet access</li> <li>Printing services, photocopies</li> </ul>
<b>Industry Revenue</b>	<ul style="list-style-type: none"> <li>\$12.5 million</li> </ul>
<b>Industry Profit Level</b>	<ul style="list-style-type: none"> <li>On average, \$5,000-10,000</li> <li>\$3 million</li> </ul>
<b>Job Creation</b>	<ul style="list-style-type: none"> <li>1,650 (2 to 5 employees per internet café)</li> </ul>
<b>Average Monthly Salary</b>	<ul style="list-style-type: none"> <li>\$500 per month</li> </ul>
<b>Regulations</b>	<ul style="list-style-type: none"> <li>Registration with municipality (2,000 Afs, nearly \$35)</li> </ul>

Internet cafés are usually small shops (10 to 20 computers), they provide internet access but also photocopying, scanning and printing services. Their clients are usually students doing research for their studies, but also jobseekers looking for jobs online. In some internet cafés, the owner offers basic courses on Internet use.

Demand varies from one city to the next. For instance, in Kabul, a larger number of people have their own computer or a smartphone with an internet connection. As a result, internet cafés have lost some of their regular clients. On the contrary, in Kandahar, internet cafés are very popular because electricity power is very irregular and fewer inhabitants have access to a computer.

As documented in the table below, prices for 1 hour at an internet café vary by location, from 30 Afs (\$0.53) to 60 Afs (\$1.06). The most expensive internet cafés are in Kandahar, where shopkeepers pay additional costs due to using generators during extensive electricity outages. Compared to 2007, the average price of internet cafés has not drastically dropped (40 Afs, \$0.71, at the time<sup>1</sup>) whereas internet connection prices have decreased overall. This suggests that either internet cafés have not opted for cheaper internet connections, or that their profit margin has increased.

<sup>1</sup> Altai Consulting, 2007.



Table 11: Price of Internet Connection per Location<sup>1</sup>

Location	Price for 1 hour of internet
Kabul	40 Afs (\$0.71)
Kandahar	60 Afs (\$1.06)
Herat	30 Afs (\$0.53)
Jalalabad	40 Afs (\$0.71)
Mazar-e-Sharif	30 Afs (\$0.53)
Pul-e-khumri	30 Afs (\$0.53)
Kunduz	40 Afs (\$0.71)

### 3.7.2 ASSESSMENT OF INTERNET CAFÉS

#### STRENGTHS

Internet cafés benefit from a sustained demand, and internet café owners report that 30 to 70 people visit their shop every day. As seen below, these cafés constitute a lucrative business and they are becoming more common in the provinces.

A 25% increase in number of users per day, with the same usage pattern, with no significant decrease in price, and most importantly, the number of internet cafés multiplied by 4 since 2007, suggest the total revenue for the sector has grown from \$2.5 million in 2007 to approximately \$12.5 million in 2013.

Case Study 13: Mirwais Internet Café, in Kandahar

#### Mirwais Internet Café – Prosperous Business in Kandahar

Haji Khan was working as an IT officer at DRRD in Kandahar, but he decided to open an internet café as he thought it would be a more profitable business. Mirwais internet café opened in 2010. It is located in the center of Kandahar, a strategic area to attract more clients. One hour of internet at Mirwais costs Haji Khan 40 Afs (\$0.71), but he charges his customers 60 Afs (\$1.06): because of power cuts, he has to amortize the price of the generator and fuel. Most of Mirwais clients are university students.

Haji Khan reports that internet cafés have flourished since the creation of the first café in Kandahar in 2006. *"In Kandahar, people don't have electricity at home, that's why we're doing so well,"* he explained. He notes that competition is tough in the city, but his strategy is to play on the quality of his welcome to attract more customers. For instance, he systematically offers tea and candies to his clients.

Haji Khan is pleased with his business, but he insists that IT education must improve. *"ICT is not as common as in other provinces. We need IT centers and universities,"* he concluded.



Picture 4: Mirwais Internet Café, Kandahar

<sup>1</sup> Based on fieldwork in Kabul, Kandahar, Herat, Jalalabad, Mazar-e-Sharif, Pul-e-Khumri and Kunduz.

Although the owners of internet cafés encountered rarely had any background in IT, they learned on the job and proved to be good technicians. For example, in Pul-e-Khumri, three brothers run an internet café and none has taken IT courses. However, the older brother previously worked in an internet café in Kabul where he learned the basics of the business, and then taught his brothers.

Internet cafés are very competitive as they have grown quickly and often operate in the same neighborhoods. This constitutes an incentive for cafés to deliver the best services to attract more customers. The cafés that thrive are the ones that offer the best internet connection and have the best location, usually close to a university or a place easily accessible to young people.

### CHALLENGES

The internet cafés interviewed were all family business. They do not keep track of their revenues, and use the money they earn for their daily expenditures. *"We take what we need,"* explained the owner of an internet café in Pul-e-Khumri. This is an obstacle to better planning and increasing profit margin.

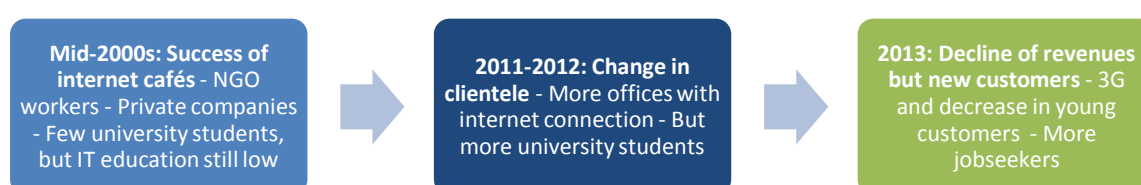
### FUTURE OUTLOOK

Internet cafés will continue to attract customers, in particular youth and job seekers. Some cafés have started offering additional services to their customers, like short-term classes. These courses contribute to maximize their profits and they could become more widespread in the next years.

However, the internet cafés interviewed systematically mentioned 3G as a potential threat to their business. *"More people, government officials, NGOs and companies, now use 3G,"* complained the owner of an internet café in Jalalabad. As such, the spread of 3G could considerably impact the sector in the next years.

In the long term, the market for internet cafés will shrink as more people get access to the internet at home. This trend is already visible in Kabul where more households have an internet connection. In the provinces, especially out of the larger provincial cities, this however might take longer and internet cafés are likely to remain one of the only places to access the internet on a computer. The figure below presents the main factors of change in the business since 2000.

Figure 18: Changing Business Environment for Internet Cafés<sup>1</sup>



<sup>1</sup> Based on interviews with internet cafés in Kandahar, Jalalabad, Kunduz, Pul-e-Khumri and Kabul.

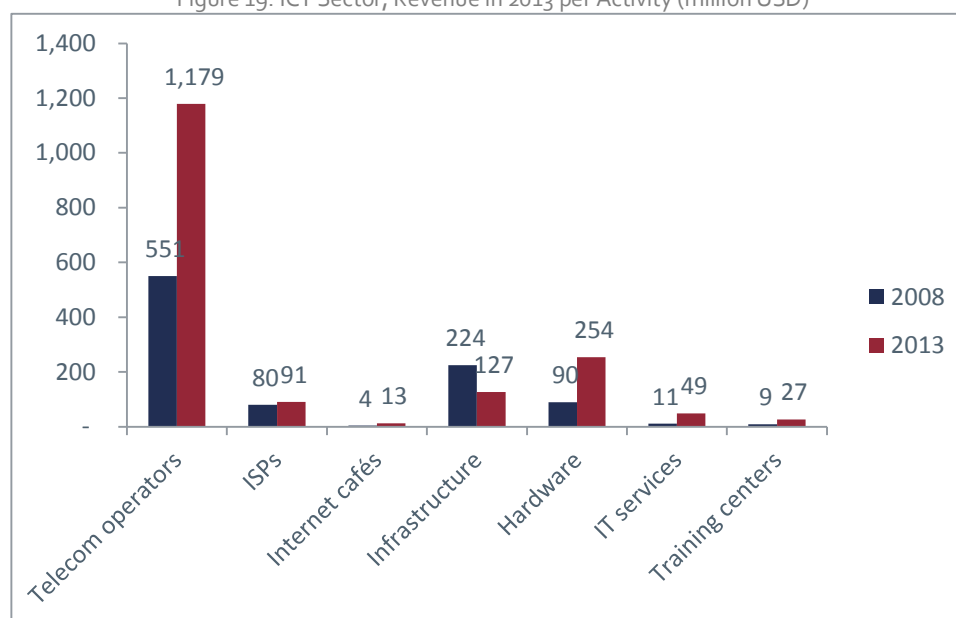
## 3.8 SUMMARY AND PROJECTIONS

### 3.8.1 IMPACT ON AFGHANISTAN GDP AND EMPLOYMENT

#### CONTRIBUTION TO GDP

Revenue figures given in previous sections give a reasonably accurate idea of the relative size of the main components of the ICT sector.

Figure 19: ICT Sector, Revenue in 2013 per Activity (million USD)



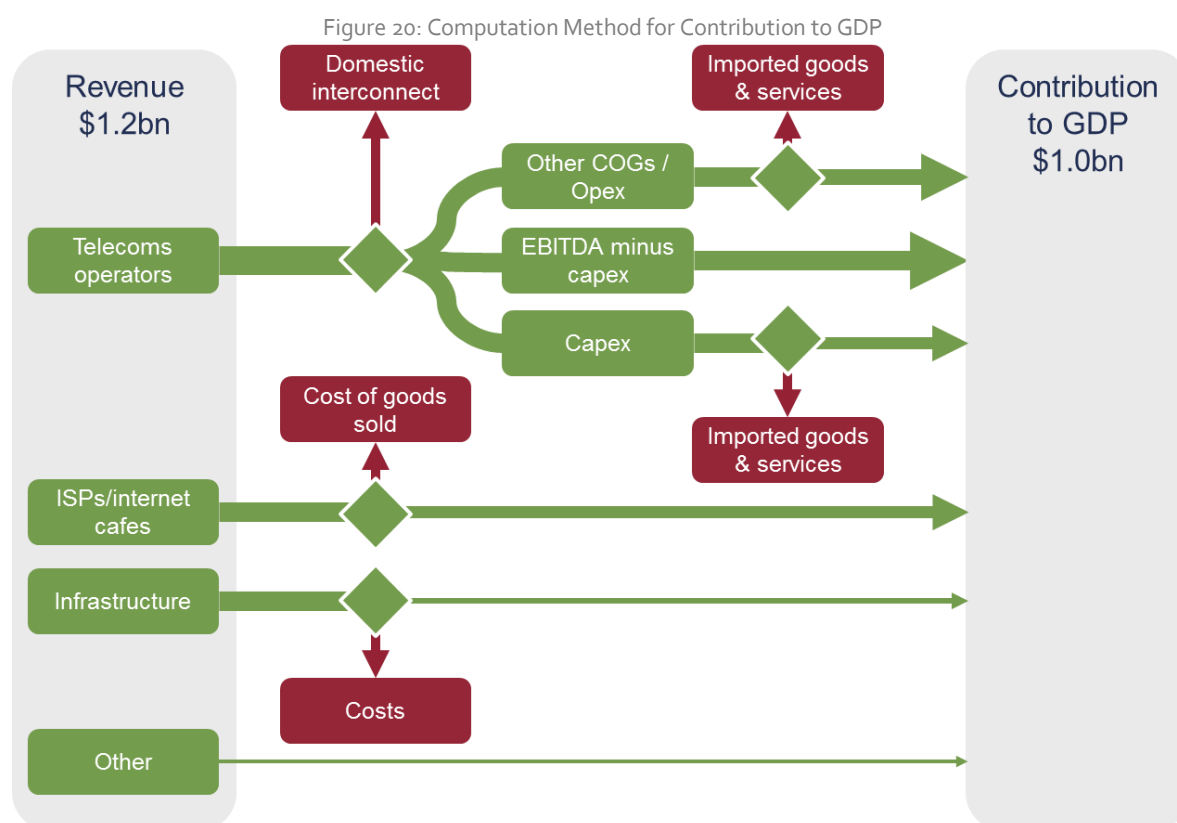
Source: Altai Consulting analysis

For 2013, it is estimated that telecom operators generated \$1.2 billion<sup>1</sup> in revenue, twice as much as all other ICT sectors' revenue combined. Since 2008, all but one sector have grown substantially, with a CAGR between 16% (telecommunication) to 35% (IT services). Telecommunication infrastructure sector has receded: it is still important, but much less so than in 2008 when MNOs were rapidly building their networks.

Contribution of the ICT sector to GDP is naturally smaller than the sum of these revenues. Strictly speaking, we should only consider value added by each sector. In a production approach to computing GDP, intermediate consumption should be removed to the gross value of outputs. For the telecommunication sector, this can be approximated by EBITDA minus CAPEX, which would give a total contribution of \$150 million for 2013.

However, since we are interested in measuring the total contribution of the sector on the Afghan economy, we decided to keep consumption of outputs from other sectors as long as they were produced in Afghanistan. For example, fuel is an important part of operational costs for mobile phone operators: its import value was removed, but not the taxes and margins of fuel transporters. Figure 20 below summarizes the computation of GDP contribution.

<sup>1</sup> Sum of all operators revenues minus interconnection revenues.



First, net revenue from telecom operators are calculated, removing domestic interconnection – domestic interconnection revenue and costs sum to zero at the industry level<sup>1</sup>. This avoids double counting of interconnection. The net revenue are split into other COGS/OPEX, CAPEX<sup>2</sup> and profit – the latter flows directly into GDP. For costs, one needs to remove the imported goods and services. In the case of OPEX, this is essentially the cost of international bandwidth, fuel costs (fuel being the largest import for telecom operators). For CAPEX, imported goods include the majority of equipment costs – but not capitalized labor costs.

For ISPs and internet cafes, the costs of international bandwidth and the costs of wholesale services purchased to telecoms operators (already taken into account in the telecoms operator contribution to GDP) need to be removed. This is essentially the majority of their COGs.

For infrastructure providers selling to telecoms operators, only the profit margin is effectively taken into account, as other GDP contributors already flow through the operators' CAPEX.

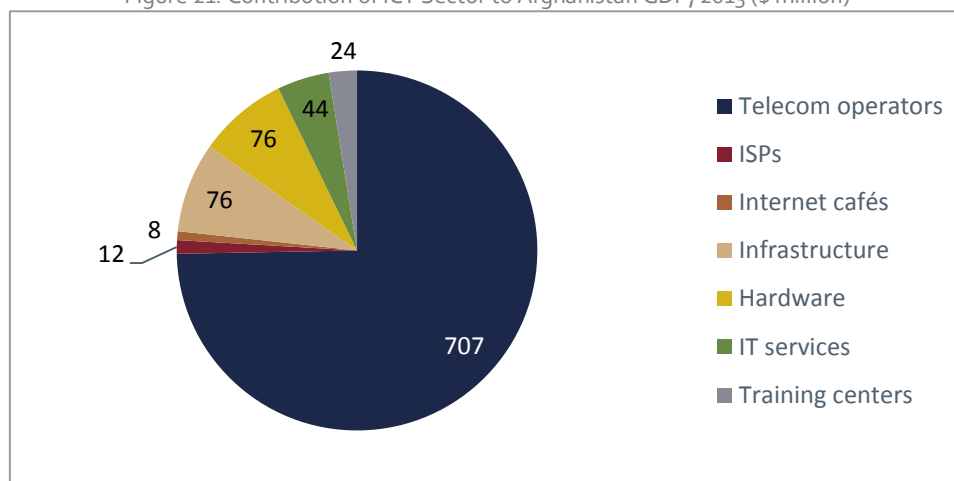
For other contributors, the full revenues are a good proxy of their contribution to GDP.

We estimate the total *direct* contribution of ICT sector to Afghanistan's GDP at approximately \$950 million for 2013, or 4.6% of total GDP (Figure 21).

<sup>1</sup> We estimate domestic interconnection costs to be about \$115 million in 2013.

<sup>2</sup> Respectively: Cost of goods sold, Operational expenditure, Capital expenditure.

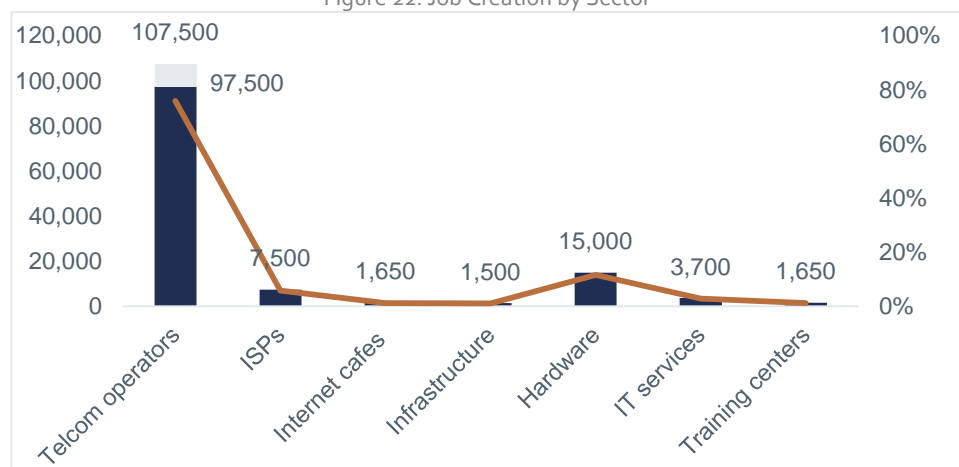
Figure 21: Contribution of ICT Sector to Afghanistan GDP, 2013 (\$ million)



Source: Altai Consulting analysis

## EMPLOYMENT

In 2013, it is estimated that the ICT sector accounted for 138,500 full-time or part-time jobs for Afghans. The overwhelming majority of these come from direct and indirect employment via telecommunication operators (76%<sup>1</sup>). Telecom is followed by hardware (11%), ISPs (5%), and IT services (3%). Employment in infrastructure, training centers, and internet cafes account for 1% each.

Figure 22: Job Creation by Sector<sup>2</sup>

Source: Altai Consulting analysis

Determining the breakdown between skilled and unskilled positions is much more difficult. In the telecommunications sector, research suggests there are 100,000 indirect employment opportunities for Afghans throughout the country. Nearly all of these jobs are scratch card and/or SIM card distributors, dealers, and resellers, which do not require technical skills and as such are considered unskilled labor. Some the MNOs do outsource technical positions, and successful wholesalers do require a business acumen that should be considered skillful. As such,

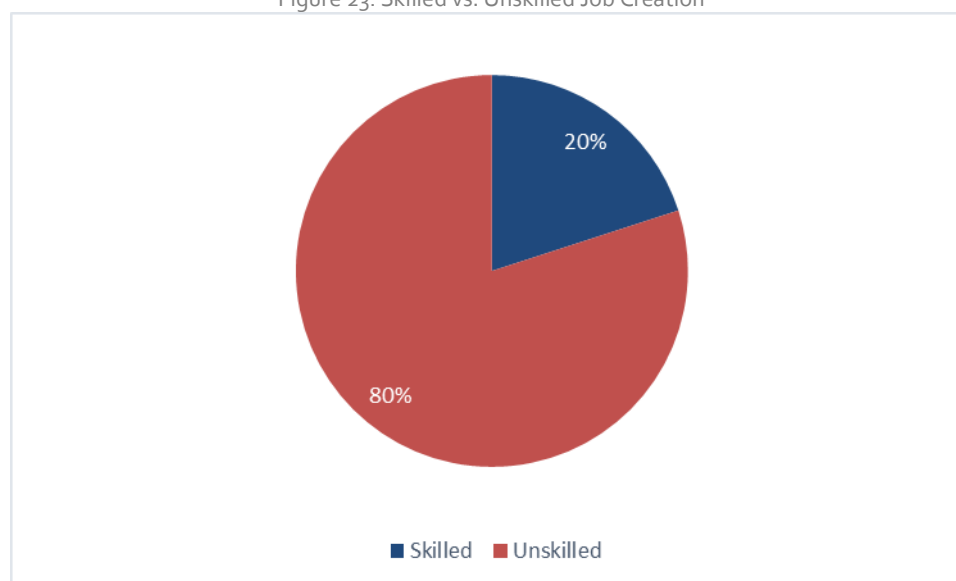
<sup>1</sup> Indirect employment figures provided by telecommunication operators are likely to overlap as a majority of scratch card resellers sell different brands.

<sup>2</sup> In this chart, handset distribution has been excluded from telecom operators' figures.

it is estimated that 5% to 10% of the indirect jobs generated by telecommunications operators should be considered skilled positions.

A large percentage of direct employment opportunities should be considered skilled as there are a number of jobs in administrative, legal, financial, technical, and operational positions. On the other hand, telecommunications operators also employ cooks, security guards, cleaners, and drivers, among others, that are considered unskilled labor. Therefore, it is fair to estimate that 50% of the direct employment opportunities should be considered skilled positions. When taking into consideration estimates among the other industries, it is estimated that 20% of the total job market created by the ICT sector should be considered skilled, whereas 80% unskilled.

Figure 23: Skilled vs. Unskilled Job Creation



Source: Altai Consulting analysis

### 3.8.2 PROJECTIONS

The contribution of the ICT sector to Afghan economy and employment is overwhelmingly dominated by the telecommunications sector. We will thus focus only on assessing possible growth scenarios for this sub-sector. The Afghan context being fairly volatile, the following scenarios assumes all other variables not specifically mentioned constant (in particular GDP per capita and exchange rate).

#### BASE CASE: DEMOGRAPHIC GROWTH

As explained earlier, the addressable market will grow in future years, primarily due to demographic growth. There are about 400,000 Afghans turning 15 each year<sup>1</sup>, which gives a good approximation of the number of new potential users per year. The real penetration rate (number of subscribers within the target population) within the 15-64 year-old group is 74%. At constant penetration rate, this would lead to nearly 300,000 new mobile phone users per year<sup>2</sup>.

<sup>1</sup> Source: CSO, 2013

<sup>2</sup> About 850,000 new users were added in 2013, but this comes from factors beyond demographic growth: extension of the sector and increase in penetration rate.

However, penetration rate is likely to increase slightly due to minor extensions in coverage and urbanization. Currently estimated at 88%, coverage of the population could increase by 1 to 2% per year until 2017. This could represent nearly 100,000 additional users per year.

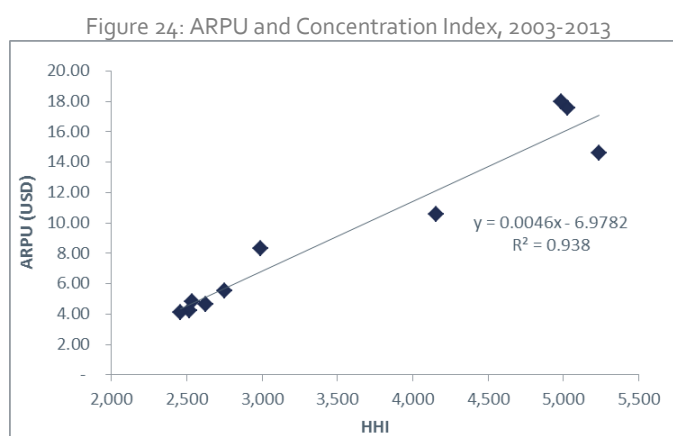
Combined, these two effects would lead to an increase of revenue for the sector of \$25 million per year by 2017 if the ARPU remains constant, bringing the revenue of the sector to \$1.48 billion in 2017. This scenario is represented as the yellow line in Figure 25. As it is almost certain, this growth in terms of number of users is factored into the two scenarios below.

The gradual drawdown of foreign troops in 2014 is expected to bring a decrease in revenue. However, this has already started (the number of troops in the country went down from 120,000 in 2012 to about 57,000 by end of 2013), and not all troops are expected to be removed in 2014. Even if foreign military represent good customers for MNOs, the future impact of their departure is therefore considered to be minor with regard to demographic growth.

### LOW CASE: DECREASE IN MTR, ENTRY OF AFGHAN TELECOM IN THE GSM MARKET

The first policy element that is expected by MNOs to have an impact on their revenue is the decrease in MTR. If off-net calls represent between 20 and 25% of calls, a decrease by 35% of MTR prices (if reflected completely on price by operators) would translate in the same decrease in off-net revenues, or a decrease of 7 to 8% in voice revenue. However, decrease in MTR will also mean a decrease in costs for individual MNOs. The sector-wide sum of these two contrary effects will only impact the reduction in the margin operators take on interconnections, fairly small.

More importantly, the entry of Afghan Telecom in the GSM market would slowly take market shares from other MNOs, which would result in additional decrease in ARPU. ARPU is strongly correlated to the sectors' concentration index<sup>1</sup>, as shown in Figure 24. Should Afghan Telecom achieve a 5% market share by 2017 to the detriment of the two main operators, this would result (all other things being equal) in a decrease in average ARPU in the sector of 23% over four years<sup>2</sup>.



Source: Altai Consulting analysis

This worst-case scenario, adding these two effects and taking into account the positive demographic growth effects seen in previous paragraph, would lead to revenue for the telecommunication sector decreasing from \$1.29 billion in 2013 to \$1.26 billion in 2014 when new MTR prices are enforced (supposing their impact is immediate, which is unlikely). The two effects combined would roughly balance benefits of demographic growth, leaving the revenue of the sector in 2017 similar to that of 2013.

This scenario is represented as the red line in Figure 25 below.

<sup>1</sup> The Herfindahl-Hirschman Index (HHI) is the sum of squares of market shares of operators. A value of 10,000 shows a monopolistic sector.

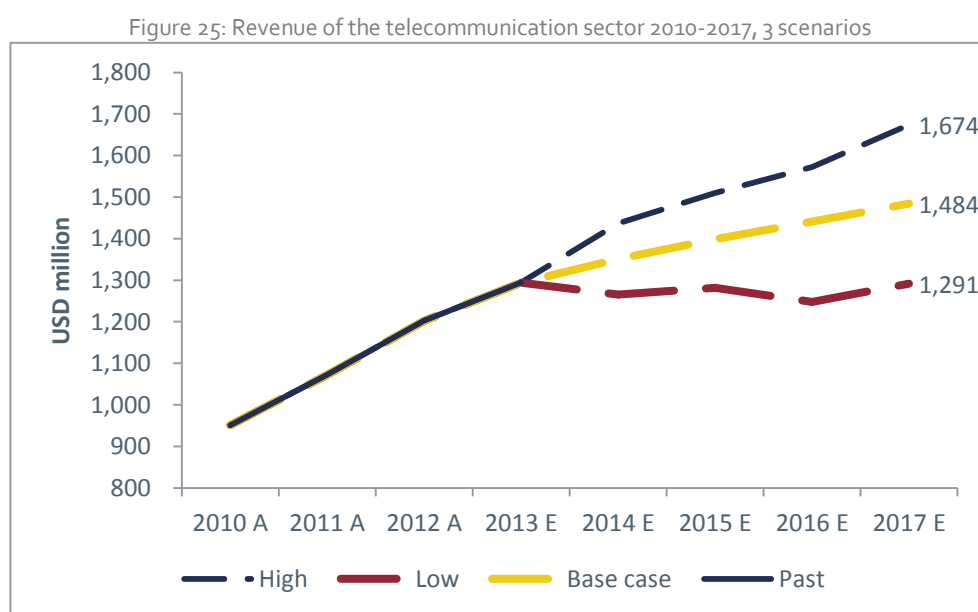
<sup>2</sup> Applying the correlation coefficient found in Figure 24.



### HIGH CASE: DATA PICKS UP

The two above scenarios do not take into account an important factor: the introduction of 3G services in a population having a growing number of internet users. Already, MNOs report that 8% of their users are equipped with a smart-phone, a ratio similar to the penetration rate of internet in the Afghan population (7.3%). With a fast-growing portion of literate population (the benefits of massive primary school enrollment soon after the Taliban ouster should start to be noticeable on the adult literacy rate ten years later), and affordable solutions, it is quite likely that both internet penetration rate and percentage of 3G users among mobile users reach 15% by 2017. This will most certainly bring additional revenues to MNOs. The typical unlimited data plan on a post-paid account is currently around \$16/month. This could drop down slightly, in particular if Afghan Telecom enters the market, but not dramatically. The current estimated data revenue per 3G user is much lower, at about \$4.3 per month, probably reflecting a large number of occasional data users. It is likely that users will consume data more regularly in future years. Data revenue per 3G subscribers increasing linearly to \$4.5/month, coupled with an increase in number of users from currently 1 million to 3.3 million, and with demographic growth, would generate an additional \$100 million per year in data in 2017, bringing total revenue of the sector to \$1.7 billion in 2017.

This scenario is represented as the blue line in Figure 25.



Source: Altai Consulting Analysis

### CONCLUSIONS

According to the above scenarios, depending on policy decisions implications and on the growth generated by 3G services, the revenue of the telecommunication sector in 2017 may stay stable (low case) or increase by \$380 million from a current \$1.29 billion (high case). In terms of contribution to GDP, this would translate to no change or an increase by \$210 million (+30%) from a current estimated \$700 million.

If one considers as an estimate that each million dollars in GDP contribution of the sector represents about 150 jobs<sup>1</sup>, the above estimates could translate in a potential gain of 32,000 jobs (high case) by 2017.

Should the set of factors leading to the two above scenarios happen concurrently, they would cancel out to reach the base case: the impact of policy decisions on sector revenues would at least partially offset the benefits of increase in data demand.

Beyond telecommunication operators and their environment, the ICT sector as a whole thus contributes to nearly \$1 billion of Afghanistan GDP, and if all other sub-sectors stay constant<sup>2</sup>, the growth in telecommunication usages alone could bring this figure up to \$1.2 billion by 2017. However, this only represents the contribution through the sectors revenue. While this includes the contribution of non-ICT firms and services (such as security, fuel delivery, legal and advisory services, etc.), this figure does not include the broader impact of communication technologies on un-related activities through increase in productivity. To evaluate this, it is necessary to turn to macroeconomics modelling.

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<sup>1</sup> This is the ratio as of 2013. This assumption implies that salaries and productivity of labor will not change significantly during the next three years.

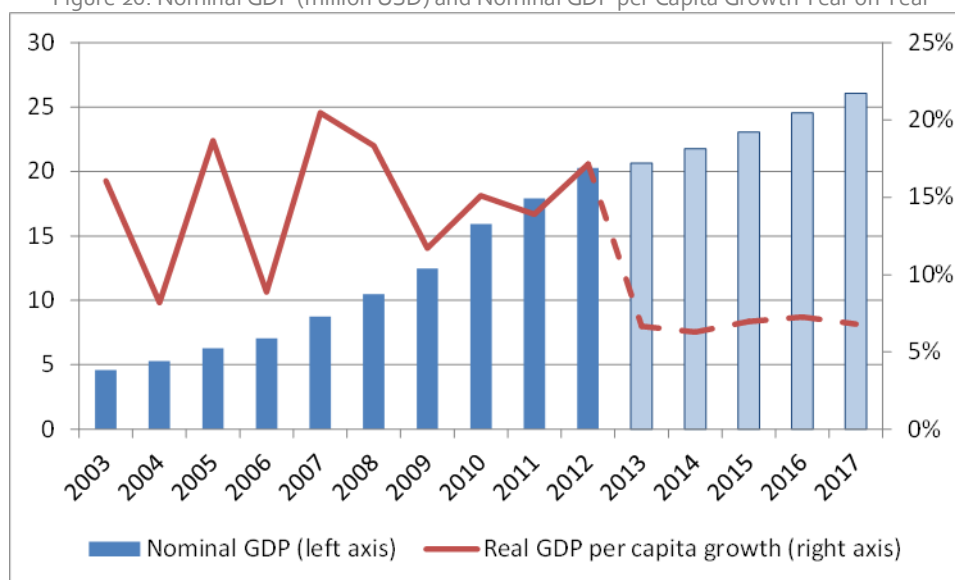
<sup>2</sup> They represent only 25% of the sector GDP, so any significant change would be unnoticeable compared to changes in telecommunication sub-sector GDP.

## 4. ECONOMETRIC MODELS

### 4.1 MACROECONOMIC CONDITIONS

Afghanistan economy has experienced a relatively high growth rate since 2002, including recent years, despite the worldwide economic downturn. Largely sustained by foreign aid, reaching USD 15.7 billion in 2011-2012.

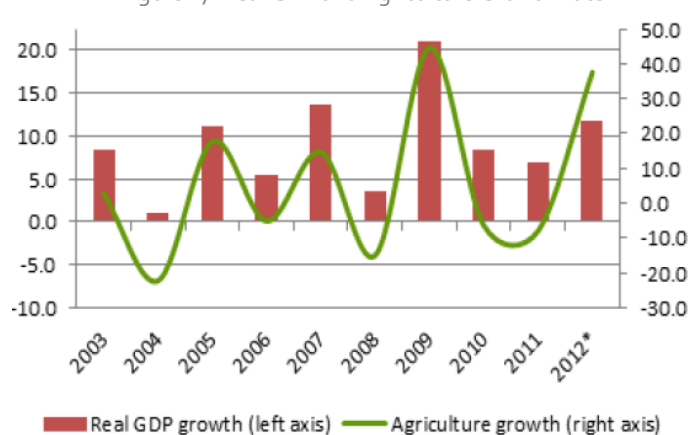
Figure 26: Nominal GDP (million USD) and Nominal GDP per Capita Growth Year on Year



Source: IMF

The World Bank points out that agriculture typically accounts for one-fourth to one-third of Afghanistan's GDP, wheat accounting for 60% of the agricultural output, and that "given agriculture's weight in GDP, economic growth tends to follow the same cyclical patterns as agricultural output."<sup>1</sup>

Figure 27: Real GDP and Agriculture Growth Rate



Sources: CSO and Ministry of Agriculture, Irrigation and Livestock

<sup>1</sup> The World Bank, *Afghanistan Economic Update*, April 2013

With the 2014 withdrawal of coalition forces, foreign aid should decline steeply, but to what extent is highly uncertain. The World Bank still forecasts<sup>1</sup> an annual growth of 4.9% per annum until 2025, driven in part by the mining sector, and with the potential to increase to 6.7%, depending on “good progress in agriculture and mining”. This is of course, assuming relative political stability in the next few years.

The IMF estimates are slightly more conservative, forecasting a 2% growth of the GDP expressed in Dollar terms in 2013 (to take into account devaluation of the Afghani compared to the US Dollar) and 5.4% to 6.1% in subsequent years. We will take these estimates as reference in the rest of this document.

Afghanistan’s population is characterized as being largely rural (75%), low-income and with a low literacy rate (estimated at 34% in 2011). These represent important constraints for the development of some parts of the ICT sector.

However, the population, estimated between 30 and 33 million<sup>2</sup>, is young (46% below 15) and growing at a rate of 3% every year. This represents a favorable demographic environment, and along with the sustained economic growth, is a positive driver of growth for the ICT sector.

In Afghanistan, nominal GDP is strongly correlated to mobile penetration rate, as shown in Figure 28 below. However, both values are essentially co-moving due to other factors: the reconstruction of the country following decades of civil war, the massive investment of the international community, agricultural growth, and many other factors explain the rapid growth of GDP. Telecommunication networks were nearly non-existent in the country in 2002, and the very rapid growth of penetration rate in 10 years is easily explained by a catch-up effect in adoption of a very affordable and useful technology. Further, the nominal GDP growth does not reflect inflation. As shown in Figure 29, *real* GDP year-on-year variation rate has since 2003 varied dramatically (between -2.7% and +17.3%) and does not correlate with year-on-year variation in mobile penetration rate.

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<sup>1</sup> The World Bank, *Afghanistan: From Transition to Transformation*, Briefing for Tokyo Conference, 2012 ([Link](#))

<sup>2</sup> In the absence of a recent census, population estimates vary widely between sources. The Central Statistical Office (CSO) places the *settled* population at 25.5 million<sup>2</sup>; the [CIA World Factbook](#) estimates place the total population at about 31 million, the World Bank at and IMF at 32.9 million. While on the high side of available figures, we will take IMF estimates throughout this document for sake of consistency in the per-capita ratios.

Figure 28: GDP and mobile phone penetration rate, Afghanistan, 2003-2012

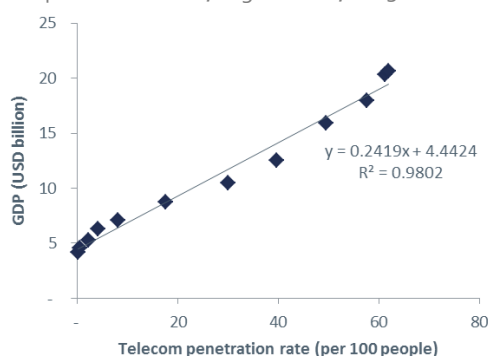
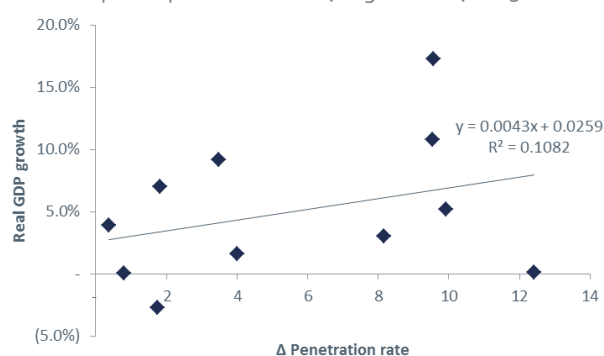


Figure 29: Real GDP growth vs. variation in mobile phone penetration rate, Afghanistan, 2003-2012



Source: Altai Consulting Analysis

A similar observation can be made on longer-term intervals: moving averages of real GDP growth over 4 or 5 years does not correlate with variation in penetration rate over the same period. There are not enough data points to extend this further.

The macroeconomic impact of the diffusion of communication technologies cannot be recovered directly from the simple regression exercise above. Indeed, it may be the case that real GDP growth was positively affected by the diffusion of communication technologies but that this positive impact is concealed by other factors affecting economic growth (in particular fluctuations in the agricultural sector) and that are not related to communication. To properly identify a potential causal impact of communication technologies on economic growth, one needs econometric models. In the next section, we will discuss rapidly several attempts to measure such an impact through econometric models, the results that are found, and their implications for Afghanistan.

## 4.2 MODELS

There is strong evidence throughout the world that communication technologies have a large impact on the economy, much beyond the revenue they generate directly and through their ecosystem: they enable new activities, provide durable increase in productivity and, in the long-term, human capital. Several authors have attempted to measure this impact through econometric models. In this section, we will discuss rapidly the models that have been used, results found and their applicability to Afghanistan.

Models discussed here look at effects of technological progress (here, more precisely, the adoption of one or several communication technologies) on economic growth. In particular, they try to measure the impact of an increase in penetration rates (for mobile phone or broadband) on GDP.

In the below application of these models, only mobile phone penetration rate is considered. The amount of data available for Afghanistan is barely sufficient to consider impact of mobile phone as a determinant of GDP, and the number of internet connections has only started increasing noticeably in the past three years, to reach barely 8% of the population: from analysts' perspective, Afghanistan is considered as "constrained" with regard to internet access. Finally, the direct contribution of telephony to GDP far outweighs any other sector contribution.

Computations made for both models are attached in annex to this report.

### 4.2.1 WORLD BANK, 2009

#### PRESENTATION OF THE MODEL

One of the most cited models is the one built by Christine Zhen-Wei Qiang and Carlo M. Rossotto with Kaoru Kimura, published in 2009 by the World Bank<sup>1</sup>. The model focuses on the economic impact of broadband in a cross-country analysis of economic growth.

The proposed model was built on 120 countries, most of which developing countries, for the period 1980-2006. The authors initially considered using a simultaneous equation model used by Röllner and Waterman (2001), but missing or erroneous yearly data incited the authors to use a Barro cross-sectional endogenous growth model to look at long-term growth rates, as was used by Waverman, Meschl and Fuss (2005) for testing the impact of telephony on economic growth in developing countries.

It used the average growth rate of real GDP per capita in USD over the period ( $GDP_{8006}$ ) as the dependent variable, and conditioning variables include:

- Real GDP per capita on the starting year ( $GDP_{80}$ )
- Average ratio of investment to GDP over 1980-2006 ( $I/Y_{8006}$ )
- Primary school enrollment rate in 1980 (a proxy for human capital stock) ( $PRIM_{80}$ )
- Average penetration of broadband and telecommunication services per 100 inhabitants over the period ( $TELPEN_{8006}$ )
- A dummy variable for country in the Sub-Saharan African Region (SSA)
- A dummy variable for country in the Latin America and Caribbean Region (LAC)

The formula used by the model is:

$$GDP_{8006} = \alpha_0 + \alpha_1 * GDP_{80} + \alpha_2 * (I/Y_{8006}) + \alpha_3 * TELPEN_{8006} + \alpha_4 * PRIM_{80} + \alpha_5 * SSA + \alpha_6 * LAC$$

The estimation results show that a 10 percentage point increase in “broadband and other telecommunication services” penetration leads to a 1.38 percentage point increase in the average in real GDP per capita growth rate, and that a 10 percentage point increase in mobile phone penetration in low- and medium-income countries raises the average in real GDP per capita growth rate by 0.81 percentage point.

#### APPLICATION TO AFGHANISTAN

The application of this methodology requires long-term cross-sectional panel data and is thus not applicable to the (limited) time series of data available in Afghanistan. However, one can use the model results to derive some implications for the impact of new telecommunication technologies on Afghanistan economy.

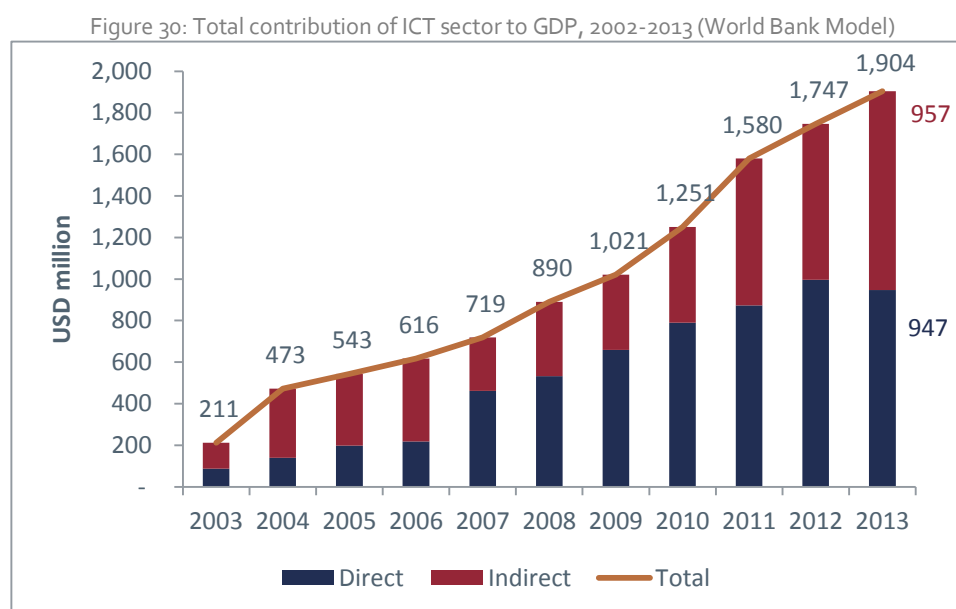
The mobile phone penetration rate has increased by 61 points between 2003 and 2013. Using the coefficient found by the authors for mobile penetration rate in low- and medium-income countries, the model suggests that this would translate into a 5% average growth rate of real GDP per capita over the same period. Over the total period, the ICT sector contributed about \$4 billion of the total \$130 billion of nominal GDP, or in real terms, 3.0% of the real GDP (in constant Afs).

The “Total” line in Figure 30 shows how this integrates into nominal GDP year by year. Values were computed by using mobile penetration growth for each year and inflating the real GDP

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<sup>1</sup> The World Bank, *Information and Communication for Development, Extending Reach and Increasing Impact*, 2009

figure given by the model<sup>1</sup>. This assumes that the coefficient found by Qiang & Rossotto is static over time. In 2013, this would indicate that the overall contribution to GDP of the sector would be \$1.9 billion, twice the direct contribution (blue bars in the chart below) of the sector as computed with the bottom-up model presented in Section 3. The difference between the total and direct contribution is generated by spillover effects, essentially in productivity gains (red bars in the chart below).



Source: Altai Consulting Analysis

However this impact might be biased upward due to limitations of the methodology used. As the authors explain, the demand of telecommunication services rises with wealth, so that there is a possibility for the mobile telecommunication penetration rate to be endogenous. Their model does not deal with this problem and tests could not rule out endogeneity. As a consequence, the model could yield higher estimates of the indirect impact than there are in reality. More sophisticated models attempt to remove the reverse causality effect and evaluate the net effect of telecommunications on GDP.

## 4.2.2 GRUBER & KOUTROUMPIS, 2010

### PRESENTATION OF THE MODEL

H. Gruber and P. Koutroumpis presented<sup>2</sup> in October 2010 a model which assessed the impact of mobile telecommunications on growth taking the latter as a determinant of the diffusion of mobile telecommunications. The approach used in their study was a structural econometric model within a production function framework that endogenizes telecommunications investment.

The authors first point out that there is a high degree of correlation between per capita GDP and mobile penetration rate. They argue that the relationship between mobile telecommunications

<sup>1</sup> Source for inflator data: IMF

<sup>2</sup> Gruber & Koutroumpis, Mobile Telecommunications and the Impact on Economic Development, 2010



and economic growth is two-way: “mobile telecommunications, like any major infrastructure, has its role in promoting growth. We however argue that mobile telecommunications are not handled as a public good like roads that are financed from the public sector budget. The funding of mobile telecommunications depends on the users of the service in the market. Therefore the users’ ability to pay, mostly determined by their income, should be a major determinant for the deployment and use of mobile telecommunication services.”

To tackle the problem of two-way causality, the authors define a simultaneous equations model using the following variables:

Variable	Description	Source
GDP	GDP (million USD)	World Bank
GDPC	GDP per capita (USD)	World Bank
K	Fixed stock of capital (million USD)	World Bank
L	Population with full or part-time work, 15-64 (thousand)	World Bank
Firm <sub>j</sub>	Subscribers of firm j	Informa
Mob_Pen	Level of mobile penetration (per 100 inhabitants)	Informa
MobPr	Mobile cellular monthly subscription	ITU
URB	Percent of population living in urban areas	World Bank
Mob_Rev	Mobile revenues (million USD)	ITU

And the following equations:

- 1) An aggregate production function, which links (for each country  $i$  at time  $t$ ) GDP to a set of production factors: the stock of capital (K), labor (L), the stock of mobile infrastructure (approximated by the mobile penetration) and urbanization:

$$GDP = a_1K + a_2L + a_3Mob\_Pen + a_4Urb + \varepsilon_1$$

- 2) An equation for demand for mobile infrastructure, as a function of GDP per capita, price of a standard service for connection to the network and the percentage of the population living in densely populated areas:

$$Mob\_Pen = b_1GDPC + b_2MobPr + b_3Urb + \varepsilon_2$$

- 3) An equation for supply of mobile infrastructure, linking the aggregate mobile revenue in a country by the mobile service operators to mobile price levels for that period, concentration index of the mobile market (HHI) and income levels:

$$Mob\_Rev = c_1MobPr + c_2GDPC + c_3HHI + \varepsilon_3$$

- 4) A mobile infrastructure production function stating that the annual change in mobile penetration is a function of the mobile revenues, taken as a proxy of the capital invested in a country during one year:

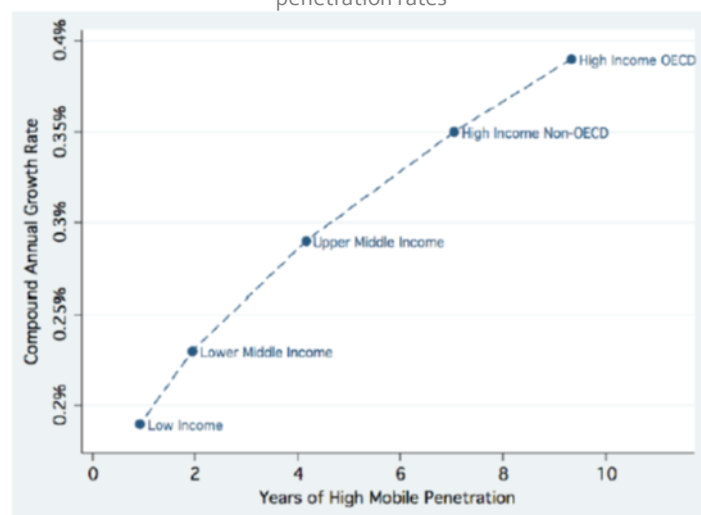
$$\Delta Mob\_Pen = d_1Mob\_Rev + \varepsilon_4$$

The model was estimated on 1125 observations from 192 countries (Afghanistan not included) for the eighteen year period between 1990 and 2007. It found an average impact of mobile phone penetration on output growth of 0.145 across countries. This coefficient is relatively high compared with the value of 0.081 found by the World Bank. However, part of the difference is due to the fact that the variable being explained in this second study is the real GDP growth rate instead of the real GDP growth rate per capita which is usually smaller.

The authors then discuss critical mass effects, which would entail that “mobile telecommunications should display increasing returns from the adoption and therefore the growth impact should increase with the level of diffusion.” Indeed, they find smaller coefficients

for lower penetration rates: 0.045 below 10% penetration, 0.051 between 10% and 40%, and 0.102 above 40%. Clustering the countries on five income groups, Gruber and Koutroumpis then draw the net contribution to growth from mobile telecommunication, by years of high penetration.

Figure 31: Contribution to growth from mobile penetration and average years of high penetration rates



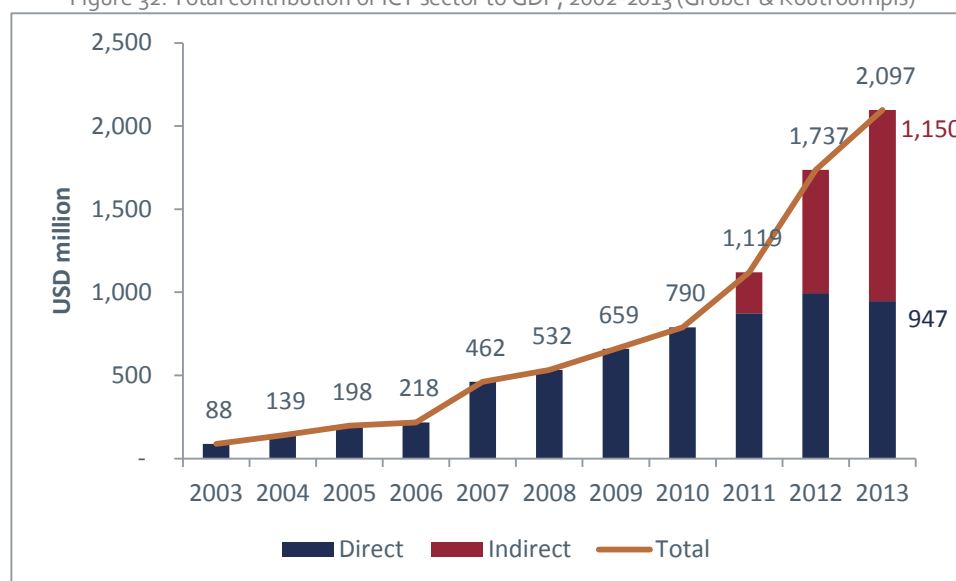
Source: Gruber and Koutroumpis, 2010

### APPLICATION TO AFGHANISTAN

Once again, it is not feasible to run the estimation of such a model on Afghanistan's data given the small sample size available. We can however apply their model's results to the case of Afghanistan. Afghanistan was not included in the authors' data set, but the results are differentiated by some of the characteristics of the countries considered. Afghanistan is a low-income country, but has spent five years at high penetration rate. According to Figure 31 above, this suggests an average compound annual growth rate (CAGR) contributed by the telecommunication sector to be between 0.25% and 0.29%. Combining the estimation results of the study with the mobile penetration in Afghanistan since 2003, this would mean that telecommunication sector contributed about 2.3% of the growth in real GDP, which is about 2.1 times the proportion of the direct contribution<sup>1</sup> of 1.1% of the sector in the Afghan economy. This indirect impact is much more important in the recent years: since 2009 we obtain a model-induced total impact of the telecommunication sector on output growth of 4.4% while the direct contribution to growth is limited to 0.5%.

<sup>1</sup> Estimated through the bottom-up model presented in Section 3.

Figure 32: Total contribution of ICT sector to GDP, 2002-2013 (Gruber &amp; Koutroumpis)



Like in the World Bank study, the indirect impact of mobile telecommunications on economic growth is substantial in the last years, and represents a value similar to the direct impact of the sector.

### 4.3 CONCLUSIONS

Information and communication technologies have had a gradually more central role in developed economies in the past decades, and their usage has become pervasive in nearly all economic sectors. In the last 20 years, the ICT sector itself has become one of the most value-generating set of activities in many countries, but the impact of ICT extends much beyond the sector itself. Many authors have attempted to evaluate this impact, and one of the objectives of this section was to do so.

However, such an evaluation is challenging in Afghanistan, for two main reasons: first, it is very clear that the indirect impact of ICT is largely dominated by the impact mobile phone penetration, which is much more difficult to evaluate than that of digitization. As in nearly all countries deprived of fixed-line telecommunication networks, the growth of mobile phone penetration has been extremely rapid in Afghanistan (from 0 to more than 12 million users in 12 years), which, coupled with a rapid GDP growth, makes it quite difficult to use in regressions. Second, the small number of data points makes it impossible to use elaborate models and very unlikely that any simple model can yield statistically robust results.

The results presented in this section therefore derive directly from the application of model coefficients built on large panels of countries, which did not include Afghanistan. Although this method is not very satisfactory from a scientific perspective, it does give a fairly good idea of the order of magnitude of spillover effects of ICT in Afghanistan.

Both models used converge around 2011 and consequently find indirect contribution to of ICT sector to GDP to be in recent years of the same order than the direct contribution, i.e. approximately **\$1 billion per year**. The second model, probably more precise, clearly shows a time effect by which the spillover of mobile telecommunication increases with time the country

spent at high penetration levels. The indirect impact of ICT in general is thus likely to increase significantly in the next few years, first because of this time effect, and second because the spillover effects of broadband usage should start being visible as soon as penetration rate reaches 15% or 20%.

The next section will give examples of such indirect impact where noticeable.

## 5. IMPACT OF ICT ON NON-ICT SECTORS

Beyond the direct contribution of ICT companies to the economy through the revenue they generate and jobs they create, the ICT sector has an impact on its related ecosystem of providers of non-ICT goods and services. This was included in previous sections in terms of direct income generation and job creation for the providers. However, the impact of large ICT firms such as MNOs goes beyond such impact.

Because they are large, managed by highly experienced staff, are often international and sometimes listed companies, such firms have to follow very strict processes and rules, best business practices they impose on their providers, for which they are often the main, if not the only client. This includes audited accounts, procurement rules, HR policies, etc. This is exceptional in a context such as Afghanistan, and has a very strong structuring effect on the firms' environment.

Such firms also typically invest a lot in human resources. Not only are MNOs and other large telecommunication providers among the largest employers, but also they also provide stable jobs in remote areas of the country and to a wide range of skills, including the less skilled such as scratch cards resellers. Furthermore, thanks to a combination of high range of needed skills, large level of employment and profitability, the ICT firms are probably the private sector actors investing the most in capacity building. By training (and sometimes sponsoring general education degrees) their staff to demanding levels of professionalisms, ICT firms have a durable impact on the country's capacity.

Finally, some telecommunication companies at least have a positive impact on communities through their corporate social responsibility (CSR) activities. This represents millions of dollars in Afghanistan, and ICT is by far the sector spending the most such activities.

Beyond the impact of ICT firms on their environment, information and communication technologies have a wider impact on non-ICT-related organizations, which we will discuss in the following sections.

### 5.1 OVERVIEW

#### 5.1.1 PRIVATE SECTOR

##### SECTORS OF ACTIVITIES

The impact of ICT varies among sectors, Altai Consulting chose key informants representative of the different economic activities in Afghanistan to produce data and conduct its analyses. Altai focused on targeting the sectors most likely to be impacted by ICT, taking into consideration the Industry Digitization Index of 2012, as well as the research team's understanding of the Afghan context. Chosen sectors included banks, media, trade, logistics, transportation, construction, agriculture and industry. The companies targeted were the largest in the cities where Altai Consulting conducted its fieldwork, in order to assess the most important contributors to the Afghan economy. However, on several occasions, the research team had to alter its initial target list to adjust to local constraints.

It is of note that (by design) all the key informants from non-ICT sectors were using ICT to some extent. All were relying on telecommunications, and all were internet users. Depending on the sector, the use of ICT was more or less intensive. For instance, the Internet was at the core of banks' activities, whereas transportation and construction companies were using it irregularly, only for ad-hoc tasks.

Table 12 below also shows some differences among sectors in regards to investment in ICT. Trade companies, along with banks and media, were more likely to have a website than logistics, construction and transportation firms. Companies operating in the latter sectors do not yet need an online presence as much as trade firms, for example, that work with international customers. Many of the companies interviewed relied on accounting software but only a few (banks, media, travel agencies) were using software and databases designed to address their specific needs. Finally, IT departments were common only in organizations relying on advanced online networks, mainly banks and media.

Table 12: Use of ICT per Sector

Sector	Number of firms interviewed	IT department/IT officer	Website	Telecom.	Internet
Banks	3	3	3	3	3
Media/Adv.	6	6	5	6	6
Trade	7	4	6	7	7
Logistics	5	2	2	5	5
Construction	4	1	1	4	4
Transportation	2	1	1	2	2
Agriculture	1	1	1	1	1
Industry	5	2	3	5	5
<b>Total</b>	<b>33</b>	<b>20</b>	<b>22</b>	<b>33</b>	<b>33</b>

## GEOGRAPHY

The impact of ICT on non-ICT sectors is also localized. Companies based in Kabul are more likely to rely on the Internet and IT services than firms based in other cities, although the main provincial capitals such as Herat and Mazar-e-Sharif are starting to use ICT more intensively. In these large cities, companies are usually connected to the Internet, most have invested in computers, and some frequently use software such as Microsoft Office Suite, Tiger and Oracle, specifically designed for better accounting practices, and open-source database applications for critical information storage.

On the contrary, as illustrated in the table below, companies based in medium-sized cities such as Pul-e-Khumri and Kunduz have yet to invest in ICT technologies. Almost none of the companies interviewed have a website, or an IT officer, and they use the Internet only for very basic functions.

The stark contrast of organizational investment in ICT between large urban centers, in particular Kabul, and small to medium sized cities is largely due to the general difference of development and economic importance between large urban centers and smaller, more remote under-developed cities spread across Afghanistan.

Kabul-based firms are more likely to use ICT because it is a necessity to remain competitive. In comparison, firms based in more remote regions face less competition on ICT use and so they have less impetus to invest in new technologies. The main obstacle of ICT use in smaller cities is also infrastructure: many of these cities still lack a sustainable electrification and so ICT do not appear like an optimal system to support their activities.

Table 13: Use of ICT per Location

Location	# of firms interviewed	IT depart./ IT officer	Website	Telecom.	Internet
Kabul	11	10	11	11	11
Mazar-e-Sharif	4	3	3	4	4
Herat	6	5	5	6	6
Kandahar	3	2	1	3	3
Jalalabad	4	0	1	4	4 (3G)
Kunduz	3	0	1	3	3 (3G)
Pul-e-Khumri	2	0	0	2	2 (3G)
Total	33	20	22	33	33

### 5.1.2 PUBLIC SECTOR

Altai Consulting also interviewed government officials in seven provinces. The objective was to get a sense of infrastructure and equipment available at the Ministries, in Kabul but also in the provinces, and to assess how ICT have changed the way public services function. Ministries were selected based on their representativeness and availability. For instance, Altai Consulting tried on more than 10 occasions to meet with the ICT Director at MoPH, one of the largest Ministries, but the Director did not answer to Altai Consulting's requests.

Table 14 below summarizes some of the key findings of the interviews with 10 Ministries and Line Ministries. All of the offices were equipped with computers and almost all of them, except for two, had internet access, mostly through Afghan Telecom.

The *tashkeel* (permanent civil servant staff) for IT Departments greatly varies, from 8 at the IT Department at MAIL to 55 at MoF. This can be explained by the nature of the services provided by these two Ministries, with the MoF largely relying on ICT for budgetary procedures. The ICT Director at MoF also insisted that the significant development of ICT at the Ministry was at the impetus of a few senior staff who had expressed their interest in computerized systems in the early days of the establishment of the MoF.

The MoF is one of the Ministries that has benefited from the most international funding and therefore it has the financial means to invest in ICT. On the contrary, the ICT Director at MAIL shared that the directorate's staff has recently been reduced with the end of a United States Department of Agriculture (USDA) program, and that his team is now too small to develop the IT applications the Ministry needs for monitoring activities in the fields.

Finally, the majority of staff members at the central level are comfortable using most elements of ICT, in comparison with staff based in the provinces who are usually less skilled in using new technologies. This is particularly visible in smaller cities such as Pul-e-Khumri and Kunduz, where employees often do not know how to make the best use of the IT resources at their disposal. This supports the previous claim on the geographical divide for the use of ICT.



Table 14: Access and Use of ICT among Ministries and Line Ministries

Ministry/Line Ministry	Computers	Internet access	# of IT Staff
Ministry of Finance, Kabul	Yes	Yes	55
Directorate of Finance, Kandahar	Yes	Yes	3
Ministry of Education, Kabul	Yes	Yes	39
Directorate of Education, Kunduz	Yes	No (waiting for internet installation)	1
Ministry of Rehabilitation and Rural Development, Kabul	Yes	Yes	10
Directorate of Rehabilitation and Rural Development, Mazar-e-Sharif	Yes	Yes	1
Ministry of Higher Education, Kabul	Yes	Yes	22
Directorate of Public Health, Jalalabad	Yes	No (staff using personal 3G)	/
Ministry of Agriculture, Irrigation and Livestock, Kabul	Yes	Yes	8
Directorate of Agriculture, Irrigation and Livestock, Pul-e-Khumri	Yes	Yes	1

## 5.2 IMPACT OF ICT ON NON-ICT SECTORS

### 5.2.1 EFFICIENCY

#### TIME SAVING

ICT contribute to increase organizations' productivity largely due to systematized procedures. New technologies "*assist companies to produce more in a shorter period of time, and allow staff members to be more efficient*," summarized the Director of Baradan Hamidi Group, a trading company in Mazar-e-Sharif.

It is difficult to quantify productivity gains, but all of the interviewees agreed on the positive impact of ICT on the efficiency of their company or department. For instance, a representative of the Ministry of Agriculture in Pul-e-Khumri explained that he was saving a great amount of time by using a template to write official letters. "*Now, I only need to change the addressee*," he said. The case study below presents another example of time saving thanks to the Internet.

Case Study 14: Pamir Cyclet, in Herat

#### Pamir Cyclet – Time saving thanks to e-mail communication

Pamir Cyclet, a company with 300 employees, shared that e-mails were of great help to spread information around the company in a limited amount of time. "*We simply need to send an e-mail to everyone, instead of calling each employee individually*," explained the Managing Director. Writing an e-mail usually takes 5 to 10 minutes, and one can assume that the Managing Director would otherwise have to call all the heads of services (10 to 12 people) who would themselves have to hold a meeting with the rest of the staff. As such, e-mail communications save nearly 1h15 to the Managing Director, and 15 to 20 minutes to the rest of the staff, every time the company's leadership wants to convey a message.

At the Ministry of Education, the ICT Department attempted to measure how ICT contributed to higher productivity. The ICT Director reported that the move to a computerized system reduced the time needed for collection and analysis of data regarding infrastructure and staff by 75%.

### FACILITATING COORDINATION

ICT also facilitate information sharing and coordination among offices. In Kabul, the firms interviewed reported that telecommunications and the Internet have made it easier to manage their offices in the provinces. Line Ministries also shared this assessment. For example, the Director of the Directorate of Communication and Information Technology (DCIT) in Herat explained that delays to address an issue have been drastically reduced since they started using the Internet in 2003. Before that, DCIT officials would have to send a physical letter to Kabul and it would take at least one week to arrive and then another week to receive an official answer. Now the office sends the request to be approved by the central ministry via e-mail, and they receive feedback the same day. This procedure saves nearly 13 days for DCIT, and ensures that the office can address issues in a timely manner.

Furthermore, organizations that need fast and secure point-to-point intranet connectivity, such as financial institutions, can now purchase such technologies. ASIX, an ISP with headquarters in Kabul (Case Study 5), provides a multitude of banks private lease circuit services, which offers the fastest and most secure internal connection currently available in Afghanistan. This allows secure connections among banks' various branches.

### IMPLEMENTATION OF M&E MECHANISMS

In addition to coordination, ICT has brought possibility of monitoring and evaluation mechanisms to organizations. In the public sector, some Ministries have established a clock-in/clock-out system. The MoF was the first to develop this system in which employees have to clock-in when they come to the office and are reprimanded if they do not arrive on time. The ICT Director at MoF recalls that the staff was initially very reluctant to the new procedure, but finally got used to it. He insists that employee attendance is now much more regular, and the time saved every day can be estimated at 30 minutes, or +6% in productivity, thanks to this method.

In the private sector, ICT have particularly benefited to logistics companies such as MTC Logistics, a firm based in Kabul that relies on a GPS system to track its 500 trucks. Thanks to this application, the company follows its freight in real time, a useful system in an environment as volatile as Afghanistan, where logistics trucks sometimes come under attack. The case study below presents another example of a company that has benefited from ICT for its operations.

Case Study 15: Barakat Group, a Trading Company in Mazar-e-Sharif

#### Barakat Group – Improved monitoring thanks to ICT

Barakat Group has operated in Mazar-e-Sharif since 1999. It imports fuel, gas, raw materials, agricultural machineries, and provides construction services. The group started using ICT in 2002, and new technologies have transformed the way the firm operates. Managers can now call their staff to ask their location and track their travels. During construction work, managers are also in touch with their field officers; they talk over the phone every night and receive pictures of the progress via e-mail. *"One person can check many activities without having to actually visit the fieldwork,"* explains Jawid Haidari, Sales Manager at Barakat Group. Overall, ICT have not only decreased the costs of the company but also increased work quality thanks to closer monitoring. *"ICT contributed to increase our revenues by 100%,"* concluded Haidari.



## 5.2.2 DECREASE IN OPERATING COSTS

### REDUCTION IN OPEX

ICT have also been instrumental in reducing OPEX for companies. Firms that import goods from abroad have particularly benefited from new technologies since staff members no longer need to travel to other countries to order their products, they simply send e-mails to their providers. For instance, Pamir Cyclet imports motorbikes from China to resell them on the Afghan market. The company estimates at 5% the decrease in its costs since it can send its order directly through e-mail, instead of having to travel to China every few months. Case Study 16 presents another example of a company that has benefited from ICT to import raw materials at a cheaper price.

Case Study 16: Afghan Craft Carpets, in Jalalabad

#### Afghan Craft Carpets – Savings thanks to ICT

Afghan Craft Carpets opened in 2006 in Jalalabad. The firm employs nearly 100 workers and produces 150 to 200 meters of carpets every month. The company has greatly benefited from ICT to reduce its costs, but also to enter new markets.

It imports raw material from China and Pakistan. Several years ago, the owner Ziaurahman Zia had to travel abroad every time he needed more silk and cotton. This was not only costly but also time consuming. Since Zia started using the Internet, he simply sends e-mails to his providers who immediately ship the material he needs. On average, he saves \$4,700 on trips every year. For a firm with profits ranging between \$20,000 and \$30,000 a year, this cost reduction amounts to nearly a 20% increase in profit.

Zia also recounts that he has gained more contracts with clients in Pakistan because he can receive pictures of the carpets they want and exactly address their demands. *"Now, I want to develop a website because more people should know about our products,"* concluded Zia.

### REDUCTION IN ICT EXPENSES

Over the last ten years, telecommunications and internet prices have considerably dropped and therefore have become affordable for the average company. The average price for a call now ranges between \$0.02 and \$0.05, against \$5 in 2002 and \$0.14 in 2006<sup>1</sup>. As for the Internet, prices have fallen from \$4,000 in 2005 to \$300 in 2012<sup>2</sup>. Internet access has also increased with the ongoing expansion of the optical fiber backbone. Firms that previously could not afford the Internet, or used it very sporadically, can now afford a regular connection. For the companies that were already using the Internet, this has resulted in a significant reduction of costs. The case study below illustrates the choice of many small to medium companies to move from an internet network to 3G, a cheaper option.

<sup>1</sup> Hamdard, J. "The State of Telecoms and Internet in Afghanistan (2006-2012)".

<sup>2</sup> Source : MCIT, <http://mcit.gov.af/Content/images/Eng-%20Internet%20Prices.png>

## Case Study 17: 3G

**3G – A Cheaper Option for Companies**

Since the launch of 3G in 2012, a number of small to medium firms have moved from a regular internet connection to 3G dongles, because it is cheaper. Out of the 33 non-ICT companies interviewed, 16 were using 3G to connect to the Internet. On average, they save \$2,000 to \$4,000 per year, depending on their size and how many computers are connected.

Kabir and Zak logistics, a logistics company in Kabul that recently moved to 3G, explained about its decision: *"Before, the Internet was very expensive, nearly \$300 per month. We solved our problem now, it is very economical."* By moving to 3G, the company saves nearly \$3,400 every year.

Another firm, Lemar Travel Agency in Kandahar has also shifted to a 3G connection and saves more than \$2,200 per year. The owner is very satisfied with 3G and claimed that it is also more reliable than the internet connection it used to have.

Afghan Pharma, a company based in Kabul with offices in all 34 provinces, reported that it started using 3G in its smallest offices, like in Kunduz, where a more expensive connection would not be profitable. 3G precisely suits small offices, which do not need a large debit for their simple operations. Afghan Pharma would probably not have connected its smallest offices if 3G was not available, and so it would have been less effective in coordinating its activities.

Companies that moved to 3G shared a last argument: it provides internet access anywhere and so it increases managers' productivity. They can check their e-mails on their cell phone, even when they are working in the field.

**5.2.3 ACCESS TO INFORMATION****BUSINESS OPPORTUNITIES**

Local firms rely on the Internet to find out about business opportunities. Most of their contracts still result from networking, but Afghan companies have increasingly used online resources to work with public institutions, international firms and foreign donors.

For example, MTC Logistics, in Kabul, regularly visits the websites of donors and ministries, and answers to tenders. Its CEO insisted: *"without the Internet, we could not have access to all these business opportunities."* For logistics and construction firms, which have almost entirely relied on international organizations and foreign troops for their development in the last years, nearly 90% of their revenues could be attributed to the use of ICT and the access to donors' business offers. The case study below presents an initiative to centralize all tenders on a single platform.

## Case Study 18: Afghanistan Building Markets

**Afghanistan Building Markets – Online business opportunities for Afghan entrepreneurs**

Peace Dividend Trust has established an online platform for international organizations to advertise their tenders. Afghanistan Building Markets website (<http://www.buildingmarkets.org/our-impact/afghanistan>) releases offers for international projects. The objective is to promote transparency and the contribution of Afghan firms to these projects. The website advertises that, as of November 2013, it has helped 680 Afghan companies to win 1,300 contracts (more than \$1 billion in value). Nearly 65,000 jobs would have been created thanks to Afghanistan Building Markets' initiative.

In general, a strong ICT sector makes market more transparent, thus more efficient. Beyond tenders, the Internet also opens a wide range of opportunities for companies willing to engage in international trade. For instance, the firm Afghan Saffron, in Herat, sells its saffron production all over the world. Almost all of its business relies on its capacity to interact with clients through e-mails, receiving their orders and advertising their new products.

## Case Study 19: Companies' Website

**Companies use their website as a showcase**

An increasing number of Afghan firms are developing a website to advertise their activities and attract more customers. The firms interviewed explained that their websites usually target international clients, and are not directed to an Afghan audience. All are available in English, in addition to Dari and/or Pashto. Barakat Group, in Mazar-e-Sharif, shared: *"Our website is more for foreign countries. Companies from Germany and India send us e-mails after visiting our website."*

Asia Pharma, a company in Herat, actually assesses how many visitors their website attracts every month. For the month of September, they found that the majority of visitors were based in the United States (1,702 visits) and the Netherlands (834). Visitors from Afghanistan only ranked fifth, with 229 visits. This supports the perception that Afghan websites are less popular in Afghanistan than abroad.

Firms also say that having a website proves that they exist. *"If you don't have a website, they (foreigners) think it is a fake company,"* stated a representative from Kabir and Zak Logistics, in Kabul.

Investing in a website has become cheaper, but its initial price still ranks between \$300 and \$1,500. This constitutes a significant investment, but none of the 22 firms interviewed that had a website could quantify to what extent their online presence had increased their revenues. Companies simply argued that this has become a new standard. It remains to be seen whether these corporate websites will become more strategic for the Afghan market in the coming years.

**TRANSPARENT MARKET INFORMATION**

ICT can prove to be a powerful tool to achieve fair competition.

Case Study 20 below shows how telecommunications can help spreading information about the market conditions, so that actors have the ability to take informed decisions about their products' sale price. This understanding of the market dynamics is a condition to a free market. It participates to curb monopolies and ensures that goods are sold at a price that benefits to both the reseller and the buyer. The potential for better market information remains largely unexploited in Afghanistan, and more could be done to increase market's transparency.

## Case Study 20: Malomat

**Malomat: "Providing agricultural incentives and economic alternatives"**

Malomat is a national agricultural price data system offered by Roshan, which provides farmers access to wholesale prices of 41 commodities in 14 markets in Afghanistan and 1 in Peshawar, Pakistan. Users access the information by using a mobile phone, either through an SMS or Interactive Voice Response (IVR) technology. The primary objective of the initiative is to "provide agricultural incentives and economic alternatives" in the hope to build rural communities by providing Afghan farmers and traders with the latest pricing information. Malomat is available in English, Dari, and Pashto by SMS. The IVR option is essential as an estimated 70% of the Afghan population is illiterate. While the Malomat system is an excellent concept, it has yet to be utilized by most farmers generally due to a lack of awareness. Moreover, for the system to truly be successful, Roshan will need to expand commodity price collection to all provinces.

System	Step 1	Step 2	Step 3
SMS	Access new message	Type commodity code (i.e. 3 01 for apples in English; 1 01 in Dari; 2 01 in Pashto)	Send SMS to 0797 000 700

IVR	Dial 0797 000 700	Choose language: 1: Dari; 2: Pashto; 3: English	Enter commodity code or press * if you don't know it. You can enter code at any time during the menu
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## MANAGEMENT INFORMATION SYSTEMS

ICT have also been very useful to establish management information systems (MIS) for firms and public services. These are strategic to improve management and develop a sound business plan. For instance, Afghan Pharma, a pharmaceutical firm, uses an application that registers all the clients' bills, along with their profile. All these data are available in the company's system and the firm relies on this information to design its marketing strategy. Thanks to its data, Afghan Pharma's staff knows when its clients will run out of medicines, and strategically engages with them during that period – to ensure that they renew their stocks with Afghan Pharma's products. *"We now control the bazaar,"* stated the Marketing Manager in Kunduz. One can infer that Afghan Pharma is so successful with its local customers because it has documented their needs. However, most Afghan companies have not yet adopted a MIS system and would still need to optimize how they manage their data to improve their business development.

Public services have also developed their own management information system to support their policy making. For instance, the MoPH now has a solid Health Management Information System Department and they work on setting up a standardized data management process. The Department collects data about existing facilities from NGOs and public entities. The long-term objective is to map operating health facilities, and to share these data with provincial and district Directorates. Overall, better quality information should help the Ministries to make informed decisions and deliver better services.

## INTERACTIONS WITH CLIENTS

Companies report that telecommunications and the internet facilitate client relations. This is critical in the Afghan environment, in which insecurity sometimes makes it difficult to hold regular meetings. For instance, logistics firms report that they were planning their activities via e-mail with their clients at the Provincial Reconstruction Teams (PRTs) since they were not always granted access to the military base. The Chief Operating Officer at Bakhtar Bank, one of the main banks in Kabul, shared that he receives 5 to 10 e-mails from clients every day. He can address their demands directly, and so they do not need to come to the bank.

## E-GOVERNMENT

### ONLINE INFORMATION

Telecommunications and the Internet are critical in facilitating access to information. All Afghan Ministries now have a website and they regularly upload updated laws and regulations, statistics and publications. For instance, the Ministry of Mines has an entire section about "Mining regulations"<sup>1</sup> addressed to mining companies. Thanks to Ministries' online resources, firms can easily learn about the legal framework in which they operate. This increased awareness will contribute to strengthen the Afghan institutions in the long term, and it will benefit to the national economy.

<sup>1</sup> [http://mom.gov.af/Content/files/Mining\\_Regulations.pdf](http://mom.gov.af/Content/files/Mining_Regulations.pdf)



## ENHANCED PARTICIPATION

E-government also has the potential to increase interactions between public services and citizens. For instance, people can call and send e-mails to civil servants to ask about information they need. These new lines of communication with officials could have a great impact, especially for people from very remote areas, far from district government offices. Although this aspect of communication has not yet been fully exploited by government offices, it does have the potential to strengthen participation, and consequently reinforce institutions' legitimacy.

### Case Study 21: E-certificates

#### E-certificates (Digital School Certificate System)

The MoE is establishing an e-certificate system, which should improve its services' transparency and efficiency. The system is entirely computerized and the delay to deliver a diploma has decreased from two months to a week. It means that the Department in charge has more time and more facility to monitor the procedures and prevent frauds. In addition, it spares people from having to travel to Kabul and lose three to five days of work. Finally, this initiative further empowers the provincial directorates, which deliver the diploma, and so strengthen local governance.

## ONLINE TRAINING

Finally, Internet can be a powerful educational tool for employees willing to strengthen their skills. Media Mark, a production company in Kabul, noted that: *"ICT make the staff more curious and encourage them to learn online."* This observation was however not common among the firms interviewed, and it appears that the impact of online resources is limited. It remains that online courses could be a great asset to increase staff's productivity, especially in Afghanistan where higher education has sometimes come under critic for being of poor quality.

### 5.2.4 ANTI-CORRUPTION

ICT also contribute to increase transparency and curb corruption, one of the main obstacles to further business development in Afghanistan. ICT allow tracking activities, in particular payments, and help to detect anomalies. For instance, the Education Management Information System (EMIS) of MoE is a collection of data about school infrastructure, but also schoolteachers. Since the establishment of the system, an estimate of 40,000 to 50,000 teachers<sup>1</sup> have been caught trying to benefit from the lack of monitoring in order to be paid twice. The case study below demonstrates how mobile money also reduces space for bribery.

### Case Study 22: Mobile Money and Anti-Corruption

#### Mobile Money as a Tool Against Corruption

Mobile money proves to be a powerful instrument to struggle against corruption when it comes to transferring salaries to civil servants. Roshan and its mobile money application, *M-Paisa*, have demonstrated that mobile money could be a way to transfer money directly to the Afghan National Police (ANP) and Afghan National Army (ANA), without going through the head of unit who was normally keeping some of his officers' salary, as much as 30%. This money transfer mechanism has drastically reduced corruption among the police and army.

<sup>1</sup> Interview at the ICT Directorate at MoE.



The Internet is also a powerful tool to raise awareness about bribery. Although the potential of social network has not been fully exploited in Afghanistan, other developing countries like Egypt and Morocco have demonstrated how documenting abuses could become a formidable tool to combat corruption. Videos of abuses are regularly posted on social media, and the “name and shame” strategy has pressurized officials to become stricter on bribery.

### 5.2.5 MIXED IMPACT ON JOB CREATION

#### ESTABLISHMENT OF IT DEPARTMENTS

Assessing the impact of ICT on job creation is particularly complex because the effect is ambivalent. On the one hand, ICT create the need for IT officers who monitor the use of new technologies in organizations. Farshid Ghyasi, the manager of jobs.af<sup>1</sup>, the main jobs portal in Afghanistan, reported that demand for IT officers had significantly grown in the last three years.

Based on jobs.af data, offers for IT officers’ position have increased by 10% from 2010 (337 offers) to 2011 (372) and 109% from 2011 to 2012 (781). The growth of the first two years illustrates the dynamism of the sector for IT graduates. Figures for 2013 suggest that the sector will be less vibrant this year, but Ghyasi insists that this is representative of a wider trend on the job market, with an overall decrease by 60% of job offers posted on the jobs portal.

Among the companies interviewed, the ones that significantly relied on ICT for their activities (20) systematically had an IT department. These departments range from one person, for the smaller companies, to eight, as at Bakhtar Bank presented in the case study below. Salaries also greatly vary, from \$300 to \$1,500 per month in the largest firms. Overall, it is of note that IT officers rarely have significant responsibilities and they are mainly in charge of basic technical work, addressing computer issues such as installing software and connecting staff to the network.

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<sup>1</sup> <http://www.jobs.af>

## Case Study 23: IT Department at Bakhtar Bank

**Bakhtar Bank – ICT at the core of the banking system**

ICT is of primary importance for banks, and their IT department is usually larger than in other institutions. Bakhtar Bank, one of the main banks in Afghanistan, has eight employees in its IT department in Kabul and was about to hire two additional IT officers at the time of the interview, to strengthen its capacity. IT staff earn nearly \$1,000 per month, a good salary on Afghan standards. Responsibilities of the ICT department are strategic for a bank since it includes maintaining the security of the system against cyber-attacks. Bakhtar Bank is thinking about developing more applications for online banking, and so it could hire additional IT officers over the next several months.



Public services are also in great need of IT officers. For instance, at MAIL, eight people work at the central level, along with one IT officer in each province. In the last five years, ICT departments have grown across all Ministries. The main difficulty for the civil service is to recruit IT officers, as salary demands of skilled Afghans are far above what *tashkeel* staff members are paid. A typical *tashkeel* staff member earns \$150 to \$200 per month, whereas IT professionals are often commanding salaries up to \$1,000 and sometimes beyond. As such, IT professionals are often hired on a contractual basis supported by donor funded initiatives such as United States Department of Agriculture's Change Management Program at MAIL, which calls into question the sustainability of efforts.

**STAFF REDUCTION**

ICT improves efficiency and makes certain jobs redundant, in particular in the administrative and financial departments of organizations. For a company like Barakat Group, in Mazar-e-Sharif, investments in an internet network and accounting software have resulted in a greater productivity and a downsizing of its administrative department. *"We need less people to complete the job,"* summarized the Sales Manager. Another group in Balkh, Baradan Hamidi Group, reported that their administrative office went from four to two people after they moved to a computerized system. Public services shared the same observation. The IT officer at DAIL in Pul-e-Khumri stated: *"there is no need to hire more people, computers can do it now."*

In essence, ICT has participated in the creation of new positions in companies, IT officers with technical tasks, but the adoption of new technologies has also resulted in reducing the size of administrative and financial departments, by up to 70% in some cases. This is a typical consequence of the shift to a computerized system in which procedures are automatized and less human resources are needed.

**5.2.6 SNAPSHOT AT ICT'S IMPACT ON SPECIFIC SECTORS****ADVERTISING**

The telecommunication sector has historically been a large driver of the advertising industry. A 2010 research estimated advertisement expenditures to range between \$55 million and \$70 million, 80% of which is being absorbed by broadcast media. Personal communications with advertising agencies suggest the ad revenue has grown to between \$80 million and \$100 million in the past three years. Media monitoring data suggests that telecom operators represent between 25% and 40% of the advertisement budgets. This suggests a contribution of MNOs to the media industry of about \$20 million per year in 2012 and 2013, or representing about 20% of the total media sector revenue.

The media sector as a whole was estimated in 2010 to employ approximately 10,000 people. From the above estimates, we can consider the contribution of the telecommunications sector to employment in the media industry at about 2,000 people.

Case Study 24: Drive Dentsu, International Advertising Agency in Kabul

### Drive Dentsu – An Afghan office for Etisalat

Drive Dentsu is an international advertisement agency that works for Etisalat in Afghanistan since 2012. The firm just opened an office in Kabul and its only client in Afghanistan



is Etisalat. Based on estimates, the MNO would spend \$10 million to \$12 million on advertisement every year. 2012 constituted a very prosperous year for Drive Dentsu, with the launch of a new product, 3G, orchestrated by a large advertising campaign. However, little of the company's revenues are invested in Afghanistan.

In Afghanistan, Drive Dentsu employs seven people: two designers (\$800-1,000 per month), two translators (\$500-600), two market managers (\$1,000) and the head of office (\$5,000-7,000). For production, Drive Dentsu relies on local production companies. The concepts are developed in the main office in Dubai, and Drive Dentsu publishes a tender for local companies. It can be estimated that the advertisement agency employs at least 30 people in Afghanistan, directly and indirectly.

## MEDIA

Media outlets have greatly benefited from ICT, to report news in real time and operate in more secure conditions. *"If we cover breaking news, it is thanks to ICT,"* said Arghand, the Director of Khabaryal News, an online news agency in Kandahar. Reporters in the field now use 3G to send their articles, and they have the capacity to operate almost everywhere. ICT have also played a significant role in improving reporters' working conditions. Editors are now in contact with journalists in the field every day, and they immediately report to the authorities if they worry that their staff might be under threat.

In addition, a few online media have started emerging, mainly Pajhwok Afghan News (

Case Study 25) and Khaama Press. Although they lack a sustainable business model and still rely on international donors for funding, these online resources have a very significant impact on the Afghan media scene. Other media outlets cannot always afford to have a national network and so they rely on Pajhwok and Khaama as sources of information.

## Case Study 25: Pajhwok Afghan News

**Pajhwok Afghan News – First online news agency in Afghanistan**

Pajhwok Afghan News was launched in 2003, and it quickly turned into a key player on the Afghan media scene. The agency has reporters in all 34 provinces and it is a reference for Afghan media outlets.

International donors initially funded Pajhwok and the agency still relies on foreign aid for the most part. Yet, it has deployed many efforts to diversify its sources of revenue. First, Pajhwok has established a system of subscriptions for its articles. The media also produces reports on specific topics, at the demand of some actors (foreign embassies, Afghan ministries, etc.) Subscriptions and reporting account for nearly \$240,000 of revenues every year.

Online advertisement constitutes another source of revenues for Pajhwok. They are limited (\$30,000-40,000 per year) and Pajhwok's marketing manager explains that online advertisement remains a narrow market in Afghanistan. Demand for online advertising is yet very likely to grow, as the number of internet users keeps progressing.

Last, Pajhwok is developing new lines of products based on ICT. For instance, it just launched, in April 2013, a system of SMS news alert in partnership with Etisalat. The profit of the operation has been small so far (around \$2,000 per month) but the agency plans on further developing this system and working with other operators.

Overall, Pajhwok employs 120 people, mostly journalists. As the Pajhwok's marketing manager summarized: *"All these people have a job thanks to ICT."*

**TRAVEL AGENCIES**

Travel agencies constitute a nascent market and it is expected to grow further. These companies entirely rely on ICT since operators conduct all their operations online. Each agency is connected to airline companies and they book flights online. Some like Sky Travel in Kabul use software they bought in India. In Kandahar alone, there are eight travel agencies. In Kabul, there are three main agencies and a myriad of smaller ones. It can be estimated that nearly 650 jobs have been created due to ICT in the travel sector. This market is likely to further expand as more people travel by plane. The case study below presents the example of a travel agency in Kandahar, which has tremendously grown over the last two years.

## Case Study 26: Lemar Travel Agency, in Kandahar

**Travel Agency relying on internet access**

Naqib Ahmad bought Lemar Travel Agency in 2011, and he set up a new IT system to be able to offer a wider selection of flights. He purchased an application in Pakistan, specially designed for travel agencies and which centralizes airlines' offers. Ahmad offers flights from all the companies operating in Afghanistan. He books the tickets online and earns a percentage on each flight. All Ahmad's activities rely on ICT and he acknowledges that they could not work without the Internet.

Competition is tough with the other travel agencies, but Ahmad is satisfied by the progression of his business, an annual growth of 30% to 40% since 2011. Ahmad's clients have increased over the last months, mainly because more people travel by plane from Kandahar, due to increasing insecurity on the road. He is confident that his business will continue to grow. *"Most people do not know how to book their tickets online, so they come to me,"* he explained. Even if they did, only a few would be able to purchase tickets online because most do not have a credit card.



Picture 5: Lemar Travel Agency, Kandahar

**DATA COLLECTION**

In the near future, ICT should also facilitate better quality data collection, and consequently more accurate statistics. Open source software make it possible to collect and enter data at the same time, which eliminates manual entry and decreases the probability of data entry officers' mistakes. Due to the spread of new technologies, it is now easier for research firms to monitor enumerator activities using smartphones and mobilephone applications.

For instance, the ICT Director at MoE reported that the Ministry started conducting mobile survey solutions on smartphones, to collect data about school infrastructure and teachers. The project is still in its pilot phase, but the procedure has demonstrated that the data collected is accurate. Surveyors can even take pictures and send the GPS coordinates of the buildings they take inventory of. This is a good augure for the research field in Afghanistan, especially for a state agency like the CSO.

**5.3 OBSTACLES TO LARGER IMPACT OF ICT****5.3.1 EDUCATION****LITERACY**

The first obstacle to a larger impact of ICT on non-ICT sectors is illiteracy. As much as two-thirds of the Afghan population is illiterate and this constitutes a structural obstacle to a higher penetration rate for the Internet. Low levels of education have not hampered the development of telecommunications, popular even among illiterate people. Firms have also been creative in developing innovative ways to counter balance illiteracy, with the development of IVR. For instance, Malomat, the application designed by Roshan for farmers (

Case Study 20), precisely relies on IVR because the majority of users are likely to be illiterate.

Although illiteracy is likely to remain the first obstacle to internet penetration, progress in primary education will help to overcome that hurdle. Afghan IT players could also follow the example of firms abroad, which have developed voice-based web services. IBM designed some applications for the Indian market, while other experiments have been conducted in African countries like Mali, and used as a tool to teach people how to read.

### ENGLISH FLUENCY AND CONTENT UNAVAILABLE IN DARI AND PASHTO

English also constitutes a key condition to the success of ICT in Afghanistan. The majority of the software and online applications are in English, while only a few products and some content exist in Dari and Pashto. Afghanistan should of course continue to develop more content in local language. More software and more applications should be translated and more developers should work on products in local language. MCIT and ATRA could play a role in that regard, and support the development of more local content.

Nonetheless, Afghanistan would still need to improve its English capacity to fully maximize its use of ICT. As a Professor of Computer Science at Kabul University explained, English is a fundamental tool to learn about IT and the level of the students remains too weak.

### BASIC KNOWLEDGE IN COMPUTER SCIENCE

Staff in Ministries and companies is not yet completely familiarized with IT, which sometimes results in equipment being underutilized. A representative of the Ministry of Education in Kunduz stated: *"our staff doesn't know how to use ICT."* The following Case Study 27 shows how, despite having received the resources, the Directorate of Agriculture, Irrigation, and Livestock (DAIL) in Pul-e-Khumri is not fully using its resources because staff does not know how to operate the hardware.

In some Lines Ministries, staff received support from donors, with GIZ delivering IT training to Directorate of Rehabilitation and Rural Development in Mazar-e-Sharif for instance. DCIT in each province also delivers regular IT courses and *tashkeel* from other Ministries is encouraged to participate. These efforts need to be further expanded to ensure that no investment in IT resources is wasted.

#### Case Study 27: DAIL in Pul-e-Khumri

##### Under-used ICT resources at DAIL

The Director of the DAIL office in Pul-e-Khumri explained that a multitude of his staff members were not using the computers they received from MAIL because they did not know how to use them (Picture 6). The IT Director reports that he has conducted trainings for the use Word, and how to use basic functions in Excel, but he insists that overall, the level is very low. The IT officer explains that a large part of the staff is older, and reluctant to use ICT. *"They would need a real training, but I don't have time for this,"* he explained. Resources at DAIL are limited and IT training is simply not a priority at this time.



Picture 6: DAIL Office in Pul-e-Khumri



### 5.3.2 INFRASTRUCTURE AND QUALITY OF SERVICE

In addition to education, the absence of adequate infrastructure also makes the use of ICT more difficult. A critical challenge is constant electrification. *"The main problem in Kandahar is electricity,"* stated the head of Directorate of Communications and Information Technology in Kandahar. Offices in the other provinces share the same concern.

Development of ICT services industry is partly dependent on the reliability of the communication networks. While Afghan mobile phone networks are fairly reliable, there is still a lot of improvement to be made on the quality of service in fixed broadband networks.

In the provinces, public and private offices also often complained about the poor quality of the internet connection. Many shared that it was too slow, or sometimes dysfunctional. Some companies were using both a network and a 3G connection to ensure that they do not lose their connection.

Many companies were actually more annoyed by the quality of the services from the ISPs and the telecommunications companies. *"One thing that really bothers us is customer care,"* said a representative from Media Mark, a small company in Kabul. Part of the problem seemingly comes from the existence of illegal ISPs, which operate at a lower price but do not offer quality services. These ISPs are popular among customers because they are cheaper, and companies are usually not aware that they contract with an illegal ISP. Another common grievance was the poor quality of Afghan Telecom's services. A number of clients interviewed complained that the state-owned company offered close to no customer services.

### 5.3.3 LACK OF COMPARATIVE ADVANTAGES

Private sector interviewees were overall very critical of the high prices of telecommunications and internet connections, especially compared to the tariffs in the neighboring countries. *"The price we pay here is very, very expensive,"* stated a representative from MTC Logistics, a logistics company in Kabul. For some firms, this has resulted in limiting the number of people who can access to the Internet. For instance, at Merjee Baba Construction, a construction company in Kunduz, only the director uses the Internet because the firm cannot afford more than one connection (3G).

Of particular importance for the potential development of IT services are the relatively high human resources costs for skilled workforce, as compared to India and Pakistan. Not only does this create a comparative disadvantage for proposing services activities to foreign companies willing to offshore them (e.g. software development, call-centers), but also it might eventually push Afghan companies to offshore some of their activities to other countries.

Besides telecommunication services, the domestic market for ICT services is relatively small in Afghanistan: even if localized services were available, the market for online retail (for examples) would be limited to a small fraction of the population by illiteracy, lack of access to Internet services and difficulties in organizing online payments in an environment with under-developed banking system.

In many countries, the sector has developed rapidly thanks to an enabling finance sector, in particular venture capitalism. Lack of access to finance is a common hindrance for the development of SMEs in all sectors in Afghanistan, and the lack of comparative advantages makes this even more difficult for Afghan ICT companies to find investors.

## 5.4 FUTURE OUTLOOK

Despite these obstacles, the impact of ICT on the Afghan economy will continue to grow in the near-term. First, the quality of the infrastructure will keep improving. Prices of telecommunications and internet services are likely to further decrease, and therefore become more affordable for a larger number of companies. The small to medium firms that still rely on internet cafés for their internet connection will have the financial means to pay for an internet connection, and consequently gain in efficiency.

Furthermore, with better quality infrastructure, one can hope that the range and depth of the services will subsequently improve. This means that companies will have the ability to operate everywhere, and even to monitor projects in remote areas thanks to better coverage. Besides, 3G seems to be positioned to play a strategic role, providing cheap and easy internet access for users. It is likely that more and more small and very small companies will start using 3G, for punctual communications with their providers and clients. This will contribute to a geographical spillover of ICT, spreading even to the smaller towns like Pul-e-Khumri and Kunduz.

In the meantime, IT companies will pursue their development, supported by a better-trained workforce. They will produce more software, database and applications tailored to Afghan companies' needs. These IT services should further enhance the productivity of local firms, reducing the time needed for administrative and financial tasks, along with improving management. It should also increase the quality of their work, opening the path to strengthened project monitoring.

These progresses will be supported by a new generation of entrepreneurs. These ones have benefited from a modern education system, they have grown up with access to mobile phones and internet, and they are overall more tech savvy than their incumbents. Therefore, they will be much more eager to invest in new technologies, and to rely on them to improve how their firm operates.

Finally, on the government side, public services will complete the establishment of e-government services. They will guarantee more efficient service delivery, which will contribute to more legitimate institutions. With more public data available, the government will increase its accountability, and encourage civil servants to become more efficient. If the government achieves its target, e-government will also help to curb corruption. However, public services will only be able to reach this target if they dedicate more attention to training civil servants, who remain largely uncomfortable with using IT.

## 5.5 CONCLUSIONS

Section 4 evaluated the spillover effect of ICT in non-ICT sectors to be of the order of \$1 billion in contribution to Afghanistan GDP. Evaluating more accurately this value or providing a breakdown by sector or types of effect is beyond the scope of this research. However, this section has identified various effects and provided examples witnessed in several sectors investigated. These effects are summarized in Figure 33 below.

Probably the most important in terms of economic effect are the gains in efficiency and (correlated) decreases in operating costs brought by ICT. Mobile phone and, to a lesser extent for now, email, have by design greatly facilitated coordination for firms operating in different geographic areas and thus allow very important savings in time, transportation costs and increase in reliability of communications – which, before telecommunication networks were in place, relied essentially on road transport and grapevine communication networks. Access to information about market prices, tenders, etc. has already been successfully generating better deals for many Afghan firms.

Figure 33: Types of impact of ICT on non-ICT sectors

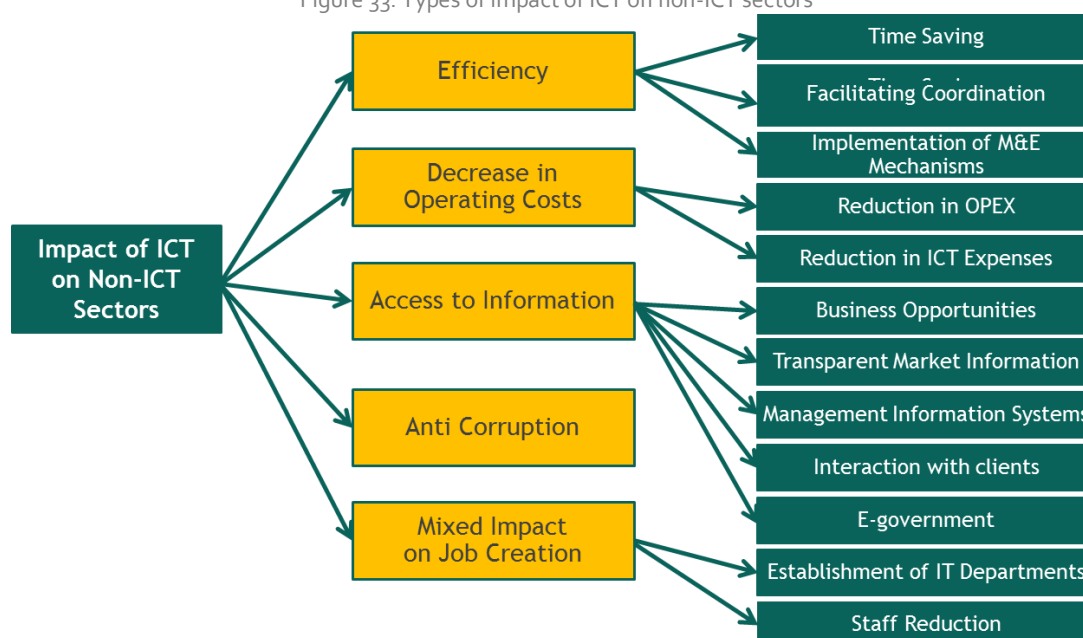
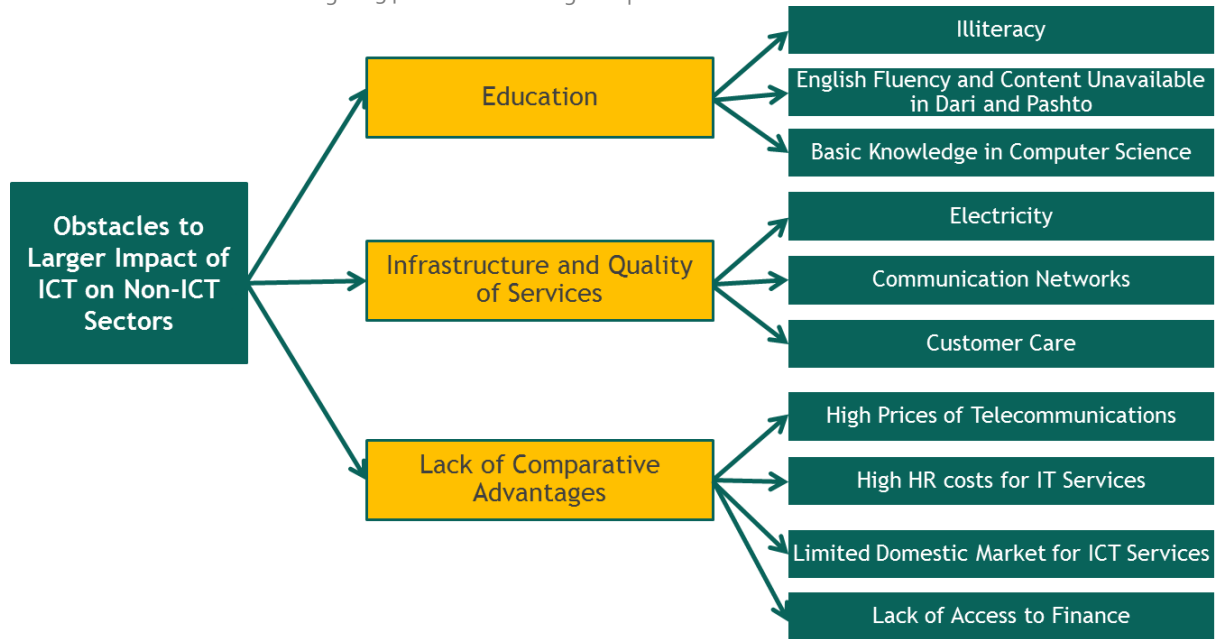


Figure 34 below summarizes limiting factors to greater spillover effects of ICT. While usage of telephone is pervasive in the country, a very important limiting factor to IT and internet usage is the low level of literacy and even lower level of computer literacy. Most of the online content and software require at least some command of English language, which is still rare in most of the small firms and among the general public. These aspects are however changing rapidly since 2002. More of a challenge is the current level of quality of service (internet access reliability, lack of maintenance capacity for IT solutions, low level of customer care), which makes it difficult to develop business activities completely dependent on ICT.

Figure 34: Obstacles to larger impact of ICT on non-ICT sectors



## 6. POLICY QUESTIONS AND CONCLUSIONS

### 6.1 POLICY QUESTIONS

At the demand of the Ministry, the present research was to investigate on potential implications of policy decisions regarding naming conventions, import regulations, cybersecurity and software certification, without more precisions. Three of these four topics were not found to be particularly in need of specific policy changes.

Naming conventions and the implementation and management of the Afghanistan country-code top-level domain (ccTLD) does not seem to pose any particular issue. Domains within the .af ccTLD are commercialized through the AFG NIC, operated by the ICT directorate of MCIT. The published policy for the ccTLD seems to be boilerplate, the registration of a domain within the .af TLD and the subdomains .gov.af, .com.af, .net.af, .edu.af and .org.af for reasonable fees, comparable to international benchmarks. The research team did not investigate on technical implementation of the domain registry: potential points of interest include IPv6 compliance and the deployment of DNSSEC (as part of cybersecurity measures).

Import regulations on IT hardware and software do not appear as a difficulty for ICT actors. None of the computer or cell phone resellers interviewed in the course of this research complained about the level of import taxes. In general, most small importers rely on transportation companies to perform the custom clearance.

### CYBERSECURITY

The development of ICT sector in a country generates several risks, among which a higher dependence on ICT services and the emergence of cybercrime. The notion of information security, or cyber security, can cover a broad scope of technical, management and legal practices to mitigate these risks.

At a national policy level, the objective of a cybersecurity policy is to build a resilient, secure and enabling ICT ecosystem, for the government as well as the private sector and the civil society. While for the general public, cyber security is often understood as protection against cybercrime, main points of focus for a cybersecurity policy more usually focus initially on critical information infrastructure protection (CIIP), incident management capability and an enabling regulatory framework.

Of particular relevance in Afghanistan is the protection of physical network infrastructure, in particular (but not only) against voluntary destruction: as was explained above, part of the OFC was damaged by insurgent attacks between Ghazni and Kandahar, and base GSM stations were destroyed at numerous times. In the case of the optical fiber ring network, this can have a very important impact, as backup fiber infrastructure or large capacity routes do not exist for large parts of the network. In case of disruption, satellite and microwave links can serve as a backup, but only to a certain extent, and as broadband becomes more used throughout the country, it will become less practical (or more expensive) to maintain sufficient backup capacity. Thus, entire provinces can be deprived of connectivity for extended periods of time.

Physical disruption can also come from non-intentional factors such as natural causes (floods, earthquakes) or lack of proper equipment maintenance. In these cases, and where protection cannot be assured (e.g. along the more than 5,000 km of fiber optics network), rapid response is required to limit the damage in time.

This is usually one of the main reasons for the development of a robust incident management capability. Since it requires a well-planned, organization and nationwide coordination of actors within various types of organizations, incident management is a typical area of focus of cyber security policies. Incident management capability organizes a small set of actors with clearly defined responsibility areas and interfaces. The capability is often managed by a National Computer Security Incident Response Team (CSIRT), which serves as a focal point for all involved actors, from government bodies to infrastructure owners and operators, technology and service vendors, etc.<sup>1</sup> As a central national ICT coordination body, CSIRTs often have extended roles beyond purely incident management activities.

Also particularly relevant to Afghanistan are questions of operations and maintenance (O&M): as was shown in other large infrastructure projects, the focus of GIRoA and the international aid has often been on building infrastructure and O&M costs and requirements were sometimes overlooked. Afghan Telecom relies heavily on international assistance for the O&M of the national OFC network and it is unclear whether it will have the capability to maintain it in working order on the long run.

A major potential issue for broadband is the lack of redundancy. The vast majority of Internet traffic is routed through Pakistan. Backup links through Iran, Uzbekistan and Tajikistan exist, but their capacity is probably not sufficient to provide an alternative route to all current traffic, and this might become more problematic as broadband adoption becomes wider. Internet traffic is also becoming more and more dependent on one central provider, Afghan Telecom, which is becoming monopolistic *de facto*.

The prevalence of cybercrime in Afghanistan is unknown. It is problematic even in much more technologically advanced countries: main targets of intrusions are often private sector actors such as banks or industries protecting trade secrets, and rarely make intrusions known to the authorities or the public.

A cyber security policy should target these problems, and more generally aim at creating an overall framework to:

- Create and maintain organizational capability within the ICT ecosystem;
- Promote definition and adoption of security standards and best practices;
- Correctly evaluate cyber security risks and plan for adequate responses;
- Plan for improved resilience of critical infrastructures, in particular through investment in redundant and backup infrastructure;
- Develop the capability around the four functions of protection, detection, response and maintenance;
- Create an enabling regulatory framework, harmonized with international frameworks;
- Encourage research and development on security technologies;
- Develop education and training to support skills development in the area of cyber security;
- Organize a robust supply-chain for critical technologies; and
- Raise awareness on cyber security among all involved actors.

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<sup>1</sup> For more information about CSIRTs, see for example Haller et al, *Best Practices for National Cyber Security: Building a National Computer Security Incident Management Capability*, Carnegie Mellon, 2011 ([link](#))

## FUTURE OF AFGHAN TELECOM

One of the most contentious points in the development of ICT sector in Afghanistan is the role of Afghan Telecom. As a state-owned company, there is a fear that it can benefit of uncompetitive advantages. In the telephony sector until early 2014, Afghan Telecom was only operating a relatively small number of landlines and CDMA connections, and was thus not in competition with the four private MNOs.

Its introduction as a GSM/3G operator is surprising to most external observers: in other countries, developed or developing, the introduction of a fifth national operator has nearly never been successful, and it is doubtful that in a country such as Afghanistan with a relatively small population and an already saturated landscape, this endeavor could succeed in a purely competitive environment. Introductory prices published early 2014 are far lower than other operators' (40% lower than Roshan prices), and while it can be considered a logical way to quickly gain market shares, it is doubtful that these prices are commercially sustainable unless Afghan Telecom is subsidized by the government or is given unfair advantages.

Afghan Telecom has already benefited from cost advantages: it did not have to pay fees for its universal spectrum license, it benefits from tax advantages over its competitors, and it is allowed to use government security forces to protect its property without being charged by MoI. Further, while other MNOs had to finance their investment through debt they have to repay, Afghan Telecom does not have to sustain financing costs. It can be said that Afghan Telecom is at least partially financed by other MNOs through MCIT. Its contract as implementer of the TDF, financed by other MNOs, is another example. Such advantages are naturally taken very negatively by other MNOs, particularly since Afghan Telecom is becoming a direct competitor.

Afghan Telecom is also the sole operator of the national OFC network. While this creates potential cybersecurity issues mentioned above, it also creates a potential privileged position on the mobile broadband services. The Open Access Policy, if implemented correctly should prevent part of the potential issues, in particular in terms of tariffs. However, the unique position of Afghan Telecom as both a retailer of 3G services as well as the unique provider of fiber bandwidth to MNOs makes it quite problematic. In all fairness, the GSM/3G operations part of Afghan Telecom should be considered as a client like any other by the OFC part of Afghan Telecom, and at least be given exactly the same tariff (tax included) and QoS than other operators. Care should also be taken that Afghan Telecom does not benefit from technical interconnection advantages over its competitors.

The problem is further complicated by the stated willingness of the Government to privatize Afghan Telecom. According to telecom experts, this might be the only way to ensure that Afghan Telecom has on the long term the capacity to manage and operate its services efficiently. The problem comes from the perspective for the future government to sell at the best price a well-established state-owned telecommunication company with a monopolistic access to critical internet infrastructure (and to a lesser degree, landlines), and a significant market share in both the ISP and the GSM/3G sectors. Unless great attention is given to the issue, consequences of this perspective are very likely to interfere with fair competition in the country.

To solve some of these issues, it can be considered to split Afghan Telecom into several entities corresponding to its current activities: a low-level network infrastructure operator, in charge of the national OFC network and given a central role in incident response; an ISP, given Afghan Telecom's current internet retail and low-scale wholesale activities; and a mobile network operator. These activities should at least be functionally and financially separated within Afghan Telecom as a good management practice, and as it will facilitate oversight by the regulator. The



fact that the Ministry operates both the regulator and a market participant that aims at becoming a significant competitor to private sector-funded MNOs generates evident conflict of interest and is a clear violation of WTO principles<sup>1</sup>, to which Afghanistan has committed to adhere. Until one or the other (or both) organizations can be given complete autonomy from the Ministry, this situation requires strong policy guidelines to make sure Afghan Telecom does not behave in a predatory manner.

### ROLE OF ATRA

In most countries enforcing antitrust regulations, where an historic, state-owned operator had a monopolistic advantage, the role of the telecommunications regulation authority was critical in enforcing fair competition. Typically, such an operator is given comparative disadvantages in order to limit its SMP, in the forms of an obligation of public service (i.e. building infrastructure and/or operating unprofitable segments of the market), an obligation to provide access to its infrastructure to other providers, and/or an obligation to offer higher tariffs than its competition. Such disadvantages might not be particularly adapted to the situation of Afghan Telecom, at least technically and possibly financially too weak to support these.

The role of ATRA in the near future will thus be critical in regulating the sector in the fairest way possible. The particular situation of Afghan Telecom will present a large challenge, and unless ATRA is sufficiently independent from political influence, it is highly possible that its decisions will be biased by political influences.

ATRA will also need to have a high-level capacity to fulfill its role. There is no doubt that in the past 12 years, ATRA has succeeded in securing the necessary foreign assistance to do so, but its internal capacity is still considered weak by experts. ATRA has nearly no capacity to enforce many of its decisions. For example, while the current spectrum assignment is considered good enough by MNOs to satisfy their future needs, MNOs complain about interference issues. ATRA does not have the technical capacity to properly diagnose the sources of the problem, to create a solution, and to force offenders to comply with regulations.

Therefore, there is an immediate need to build technical and management capacity at ATRA, and to pave the way towards complete autonomy (in terms of capacity) and political independence from the Ministry leadership.

### ROLE OF MCIT

The MCIT has been obviously responsible for a good part of the sectors' successes in the past 12 years. Since its inception, the Ministry has organized its activities around five guiding principles: 1) creation of a legal and regulatory environment that nurtures and accelerates industry growth; 2) engagement of private investment to the greatest extent possible; 3) establishment of a level playing field; 4) introduction of market liberalization; and 5) encouragement of Internet usage and information and communication technologies. These principles have been followed successfully.

Now that most of the groundwork has been accomplished, additional goals and guiding principles should be set:

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<sup>1</sup> "The regulatory body is separate from, and not accountable to, any supplier of basic telecommunications services. The decisions of and the procedures used by regulators shall be impartial with respect to all market participants."

First, the Ministry should dedicate efforts to keep expanding and consolidating critical telecommunication infrastructure. This not only means sustained investment in the national OFC backbone network and related infrastructure, as well as any other physical and organizational telecommunication infrastructure considered critical, but also a large effort capacity building and organizational activities to guarantee that this infrastructure will be properly managed, maintained, protected and used in the most efficient manner.

Second, and as a consequence of the first point, the Ministry should engage in a deep reform of Afghan Telecom. Currently, Afghan Telecom does not have the capacity to operate and maintain properly its assets; it does not have a clear idea of its asset base or its cost of operations; according to experts, it is overstaffed with under-trained employees; its organizational structure is most certainly ill-adapted to the challenges ahead.

Third, the Ministry should make sure the legal and regulatory environment will durably enable fair and competitive practices in the sector. It should bring ATRA to the level at which it can operate autonomously within a set of clear and sound guiding principles, make sure that this autonomy will be respected in the long term and that ATRA will be given the tools to see its decisions enforced.

Finally, in alignment with its fifth initial guiding principle, the Ministry should work together with other ministries and government institutions to actively prepare the ground towards a more pervasive digital economy.

As shown in this report, usage of IT and Internet is slowly starting, and roadblocks are numerous: literacy rate, education to basic IT, high quality specialized training are challenges that have to be addressed in a consorted effort with ministries of Education and Higher Education. The largest part of the ICT workforce is essentially trained on the job by the private sector, but it is expected that as IT becomes more prevalent, human resource needs will grow stronger and the current training capacity might not match the needs. The government should thus monitor closely and regularly the needs of the sector and plan ahead for workforce development.

In the absence of localized content and Afghan e-commerce, greater adoption of new technologies will be initially fostered by government services: successful e-Governance and m-Governance endeavors will not only generate better and faster delivery of public services, but will also incite more Afghan companies and citizens to connect and have a productive use of IT. If design, development and O&M of such services are contracted locally, this will also increase the local production and maintenance capacity.

While there are a few activities to foster technological start-up developments, the market is probably not yet ready to accommodate the development of a successful net-economy. On the business-to-consumer side, a large impediment is the total lack of electronic payment means. The banking sector is under-developed and probably not yet solid enough to propose such means, but this will have to be addressed rapidly. For now, the only sources of revenues for digital B2C activities will be advertisement (low) and possibly payment through mobile money platforms. The latter should be made possible through an harmonization and interconnection of existing platforms, at least as a remedial mean and as a potential long-term solution for online micro-payments.

## 6.2 GENERAL CONCLUSIONS

The primary objective of this research was to evaluate past impact of ICT sector on Afghan economy and employment, and attempt to forecast short-term impact for the next three years. As pointed out by numerous observers, the development of ICT sector in Afghanistan is considered as one of the best success story of the past 12 years. This study was meant to depict this picture with finer details and evaluate quantitatively the impact of the sector beyond the contribution to national revenue, the only figure commonly available.

### CHALLENGES

Challenges were numerous, first to try and evaluate the revenue of various segments of the sector. The vast majority of ICT organizations are private and are very reluctant to communicate critical financial data. Beyond a small number of very large players, the sector is characterized by a large number of micro- and small enterprises, many of which do not keep useable accounts. Furthermore, fiscal and regulatory authorities have proven unable or unwilling to share their records, even aggregated. It was therefore necessary in many cases to use a combination of proxy variables, benchmarks from other countries and triangulation of data points in order to compute significant estimates. We believe that estimates given in this report are credible within reasonable margins of error. However, the calculation methods did not allow the differentiation of respective contributions of ICT firms and of their providers.

The second set of challenges was to assess the overall impact of ICT on the Afghan economy, beyond the direct contribution of various segments. Elaborate models have been built and tested on more advanced countries with success. In the case of Afghanistan, where ICT services only started 12 years ago and are still for the largest part of the population limited to mobile phone, it was not possible to reconstruct indirect contribution, either from the bottom-up, or from a robust econometric model. We had to resort to findings of models run on large panels of countries, often at anterior times, almost never including countries similar to Afghanistan. Figures found through both models tested converge for the past two years to a credible figure for indirect contribution to GDP, although it should probably be considered as a high bound.

### PAST IMPACT

Figures highlighted in this report show indeed that the ICT sector has been an important driver for the growth of Afghan economy and employment: it contributes directly to GDP at a very significant level; its influence is already visible in many non-ICT sectors; and the spillover effects will certainly grow stronger with time. The rapid growth of the sector was certainly characteristic of a fairly inelastic demand until now: it has followed closely the gradual extension of service coverage.

The development of the telecommunication sector in Afghanistan is very particular in that it is the only sector that has been able to grow substantially mostly without the external assistance of foreign donors. An important enabling factor was the sound governance of the sector, which from fairly unregulated, in order to promote rapid equipment in infrastructure, evolved to a more regulated environment meant to promote wider access to the poorest through more intense competition. Regulation authorities also ensured the sector was granted appropriate resources to develop: to the contrary to other countries, spectrum management seems to be reasonably sound.

This research was commissioned at an interesting moment in the development of the sector, a turning point at which the telecommunication sector becomes more mature, nearly reaching saturation (at least to the extent of coverage that private investors are willing to fund) and prices

are driven down by competition. Of concern for current stakeholders are the introduction of a fifth operator (which has never been durably successful in the rest of the world) and potential policy decisions which might weaken operators' profit margins, thus their capacity and willingness to invest.

### **FUTURE PERSPECTIVES**

While there are still resources of growth, particularly in the development of mobile broadband, it is very likely that growth will go at a slower pace in the near future than in the past years. Smaller profit margin and more competition in the telephony sector will mean a more fragile equilibrium, and therefore that particular attention should be placed on regulation and sector governance, so that existing operators are not driven to stop their activities.

Similarly, the Internet sector is also undergoing a transition from a high-profit, low volume B2B market to a higher volume B2C market with smaller profit margins. Attention of the regulator is required to make that Afghan Telecom's position in the sector does not create potential risks.

Meanwhile, the attention of policymakers should be shifted from enabling infrastructure building to securing existing infrastructure, through appropriate O&M planning, making sure development is not inhibited by anti-competitive practices, and investing in human capacity development to gradually replace foreign capacity.

As a whole, it is thus expected that the direct contribution of the sector to Afghanistan GDP will stay significant, but might not be as important as in the past years. Studies suggest however that the indirect benefits of the sector increase with time: the overall contribution of the sector to GDP might be more driven by its indirect impact than by the sector revenue.

These effects however are constrained by other factors, such as literacy (for internet access), the sophistication of the banking sector (for online payment) and the financial sector (to invest in technological ideas), and more generally the economic capacity of the domestic market. On the long term (beyond 2017), the sector will probably be less of a driver, and more dependent on the development of the Afghan economy as a whole, before it can start being a driver again.

## 7. ANNEXES

### 7.1 LIST OF KEY INFORMANT INTERVIEWS

#### ICT PRIVATE SECTOR

ICT Private Sector: 69 KIIs					
1	Mohammad Azizi	AIMS - Executive Director	Kabul	13-oct	IT Services
2	Hayatullah Wahdat	Alcatel Lucent - Country Representative	Kabul	21-oct	Infrastructure
3	Rafi Bayat	Farhad Computer Co. - Owner/CEO	Kabul	26-oct	Hardware
4	Jamal Noorzai	New Dunia Telecom - Owner/CEO	Kabul	28-oct	ISP
5	Mohit Anand	IO Global	Kabul	30-oct	ISP
6	Mohaymen Sahebzadah	ACG - Owner/CEO	Kabul	31-oct	Infrastructure
7	Farshid Ghyasi	Netlinks - CEO	Kabul	5-nov	IT Services
8	Hameedullah	Tolo internet café - Owner	Kabul	7-nov	IT Services
9	Ashoqullah	Sahel Computer Store - Owner	Kabul	7-nov	Hardware
10	Mohammad Nabi	Lal Mohammad Computer Shop - Owner	Kabul	7-nov	Hardware
11	Ikramullah	Ikramullah Computer Store - Owner	Kabul	7-nov	Hardware
12	Alireza Akbari	TechSharks - Lead UI/UX Web Designer-Programmer	Kabul	10-nov	IT Services
13	Rameen Aziz	ASIX - CEO	Kabul	12-nov	ISP
14	Khusnoood Nabizada	Bargsabz - President	Kabul	17-nov	IT Services
15	Ajmal Mohammad	Upshot - Business Development Manager	Kabul	19-nov	IT Services
16	Farshid Sahar	Negaar - Founder/CEO	Kabul	19-nov	IT Services
17	Mohammad Nazir Bunyad	Easy Connect - CEO and President of NISPAA	Kabul	20-nov	ISP
18	Kevin Avers	AWCC - Director, Network Rollout	Kabul	21-nov	Telecom.
19	Khalil Adeeb	ZTE - Implementation Technical Manager	Kabul	26-nov	Infrastructure
20	Saifullah Wasiq	ZTE - Project Coordinator	Kabul	26-nov	Infrastructure
21	Mujeeb Urahman	ZTE - Implementation Technical Manager	Kabul	26-nov	Infrastructure
22	Baseer Baheer	Tech Nation - Vice President	Kabul	28-nov	IT Services
23	Omar Mansoor Ansari	Tech Nation - President and President of NICTAA	Kabul	28-nov	IT Services
24	Mohammad Naser Naseri	MTN - Senior Manager Corporate Affairs (Legal Team)	Kabul	2-dec	Telecom.
25	Sana Gul	Scratch Card Seller	Kabul	3-dec	Telecom.
26	Sardar	Mustafa Amiry Mobile Store - Vendor	Kabul	4-dec	Hardware
27	Waheeda Sikander	Rana Higher Education Institute - Head of Computer Science Department	Kabul	3-dec	Education
28	Wali Mohammad Sultani	AWCC	Kabul	3-dec	Telecom.
29	Imran Nawaz	AWCC – Financial Officer	Kabul	3-dec	Telecom.
30	Sanjiv Saxena	Ariana Network Service - Director of Operations	Kabul	4-dec	ISP

31	Timothy Root	First Rate - Software Manager	Kabul	7-dec	IT Services
32	Amin Nazari	First Rate - Software Engineer	Kabul	7-dec	IT Services
33	Mohamand	Mohamand Cellphone - Owner	Kabul	7-dec	Hardware
34	Ahmad Jawed	Jawed Scratch Card Shop - Owner	Kabul	9-dec	Hardware
35	Homayoun Sayedi	NEDA Telecommunications - Deputy General Director	Kabul	9-dec	ISP
36	Mohammad Faisal	Suliman Cellphones - Owner	Kabul	9-dec	ISP
37	Ahmad Payad	ARTS - CEO	Kabul	9-dec	IT Services
38	Hari Narayan	Etisalat - Chief Financial Officer	Kabul	10-dec	Telecom.
39	Dr Ali Asgharzadeh	Etisalat - Chief Commercial Officer	Kabul	10-dec	Telecom.
40	Altaf Ladak	Roshan - Chief Operating Officer	Kabul	11-dec	Telecom.
41	Sayed Mohammad Asgar	Afghan Telecom - Chief Marketing Officer	Kabul	12-dec	Telecom.
42	Neak Mohammad Akbari	Optic Communications - General Manager	Kabul	12-dec	Infrastructure
43	Saifuddin Sepehr	Microcis - Manager	Herat	11-nov	IT Services
44	Fazl Monir Ghazizadah	Helal Afghan Institute - Director	Herat	12-nov	Education
45	Farzad Wahabzada	4sat - Founder, CEO	Herat	13-nov	IT Services
46	Hamidi CS	Herat Host - Founder, CEO	Herat	13-nov	IT Services
47	Massoud	Herat Host - Founder, CEO	Herat	13-nov	IT Services
48	Said Ahmad	Abdul Samad SIMs shop - Owner	Kandahar	17-nov	Telecom.
49	Esmatullah	Esmat Computer Shop - Owner	Kandahar	17-nov	Hardware
50	Haji Khan	Mirwais Internet Café - Owner	Kandahar	18-nov	IT Services
51	Said Jawad	Stream Link - Manager	Kandahar	19-nov	ISP
52	Shaysta Khan	AfNet ISP - Owner	Kandahar	19-nov	ISP
53	Abdul Wakil	Realsoft - CEO	Kandahar	20-nov	Software
54	Bakht Wali Jan	Zia Institute of Computer Sciences - Professor	Kandahar	20-nov	Education
55	Hedayatullah	Hejratullah Chaparhari Computer shop - Owner	Jalalabad	17-nov	Hardware
56	Mohammad Rafi	Computer and Communication - Owner	Jalalabad	17-nov	Hardware
57	Eng. Nangialy	Rokhan Internet Club - Owner	Jalalabad	18-nov	IT Services
58	Aimal Sultani	Stream Link - Manager	Jalalabad	19-nov	ISP
59	Bakht Wali Jan	Zia Institute of Computer Sciences - Professor	Jalalabad	20-nov	Educ.
60	Eng. Aimal	Fast Net - Owner	Jalalabad	20-nov	ISP
61	Azimulhaq Azimi	Raha Consulting and Technology - Director	Mazar-e-Sharif	10-nov	IT Services
62	Farid Ahmad Kazmi	Kazmi Host - Director	Mazar-e-Sharif	19-nov	IT Services
63	Mohamad Halim	Sadat Institute of Higher Education - Head of Dep.	Mazar-e-Sharif	19-nov	Education
64	Waisuddin Rahimyar	Rahimi Binary Town - Director	Mazar-e-Sharif	20-nov	IT Services
65	X <sup>1</sup>	Scratch Card Seller	Pul-e-Khumri	11-nov	Telecom.
66	Shaghasie	Faizi Internet Clud - Owner	Pul-e-Khumri	12-nov	IT Services
67	Haji Sharif	Lona Star Computer shop - Owner	Pul-e-Khumri	12-nov	Hardware

<sup>1</sup> For the security of the interviewee, Altai Consulting chose not to disclose his identity.

68	Zinudin	Aisa Internet Club - President	Kunduz	18-nov	IT Services
69	Abdul Qadir	Nawie Nalege Computer Shop - Owner	Kunduz	19-nov	Hardware

## NON-ICT PRIVATE SECTOR

Non-ICT Private Sector: 36 KIIs					
1	Nazrul Islam	Afghanistan Commercial Bank - Chief Executive Officer	Kabul	4-nov	Bank
2	Tasawar Hussain	Bakhtar Bank - Chief Operat. Officer	Kabul	10-nov	Bank
3	Sardar Ahmad	Kabul Pressistan - Managing Director	Kabul	10-nov	Media/Adv.
4	Matthew Robinson	FMFB - CEO	Kabul	10-nov	Bank
5	Naeem Razwani	FMFB - Head of Product Development & Marketing	Kabul	10-nov	Bank
6	Fatehullah Baig	FMFB - Head of IT	Kabul	10-nov	Bank
7	Imran Khowaja	Drive Dentsu - Account Director	Kabul	17-nov	Media/Adv.
8	Mohammad Sufyan	Pajhwok Afghan News - Project Manager	Kabul	19-nov	Media/Adv.
9	Abdul Kabir Noori	Kabir & Zak Logistics - Chief Executive Officer	Kabul	21-nov	Logistics
10	Abdul Hasib	MTC Logistics - VP Operations	Kabul	23-nov	Logistics
11	Taj Mohammad	Afghan Builders Consortium - President	Kabul	24-nov	Construction
12	Reza Mohammad	Sky Travel Agency - IT Manager	Kabul	27-nov	Transports
13	Saleem Totakhil	Media Mark - Marketing Officer	Kabul	27-nov	Media/Adv.
14	Parwiz Faqiri	Pamir Cyclet - Manager Director	Herat	10-nov	Trade
15	Nasir Ahmad Chisti	Chisti Stam and Metallic Boards - Founder and CEO	Herat	10-nov	Industry
16	Mir Bashir Ahmad Khair Andish	BaMSA - General Manager	Herat	11-nov	Trade
17	Mohammad Shah Khairi	Asia Pharma - General Admin/Finance Manager	Herat	12-nov	Trade
18	Hamed Gholami	Asia Pharma - General Marketing & Sales Manager	Herat	12-nov	Trade
19	Hamid Najibzadeh	Herat Nut & Bolt - Vice President	Herat	13-nov	Industry
20	Ghaffar Hamidzai	Afghan Saffron - Founder and CEO	Herat	13-nov	Agriculture
21	Naqib Ahmad	Travel agency - Owner	Kandahar	18-nov	Transports
22	Sardar Mohammad	Afghan Natlas Logistics - Owner	Kandahar	20-nov	Logistics
23	Arghand	Khabaryal News Web - Owner	Kandahar	21-nov	Media/Adv.
24	Faridoon Omary	Arab Wafa Logistics - Owner	Jalalabad	16-nov	Logistics
25	Mujeeburahman	Ahmad Zai Rekshaw Fabrication - Owner	Jalalabad	17-nov	Industry
26	Mohammad Hilal	Afghan Watan Construction Company - Owner	Jalalabad	20-nov	Construction
27	Ziaurahman Zia	Afghan Craft Carpet Company - Owner	Jalalabad	20-nov	Industry
28	Jawid Haidari	Barakat Group Ltd - Sales Manager	Mazar-e-Sharif	18-nov	Trade
29	Yaqub Ali Mohebi	Yaqub Mohebi Industrial Company - Director	Mazar-e-Sharif	20-nov	Industry
30	Alha Hedayatullah Hamidi	Badaran Hamidi Company Ltd - General Manager	Mazar-e-Sharif	21-nov	Trade



31	Nesar Arianfar	Newsha Production - Public Relations Manager	Mazar-e-Sharif	21-nov	Media/Adv.
32	Hamidullah	Baktash Hamid Zada Construction Company - Owner	Pul-e-Khumri	10-nov	Construction
33	Haji Ghulam Sadar	Shirkat Brothereran Etafaq Ghorband Transports - Owner	Pul-e-Khumri	11-nov	Logistics
34	Mohammad Basheer	Afghan Pharma - Marketing Manager	Kunduz	19-nov	Trade
35	Sheer Mohammad	Oil Supply Trading Company - Owner	Kunduz	19-nov	Trade
36	Said Rahimullah	Merjee Baba Construction - Owner	Kunduz	20-nov	Construction

## ICT PUBLIC SECTOR

ICT Public Sector: 11 Kills					
1	Ahmad Saeed	Afghan Telecom - COO	Kabul	22-oct	
2	Mohammad Ismail Bhat	MCIT - Project Management Specialist	Kabul	22-oct	
3	Ajmal Ayan	ATRA - Board Member	Kabul	17-nov	
4	Muhammad Aimal Marjan	MCIT - Director General ICT	Kabul	30-nov	
5	Abdul Wakil Shergul	ATRA - Chairman of ATRA Board	Kabul	30-nov	
6	Sayeed Noor Ahmad Shah Alavi	MCIT - Prov. Director	Herat	12-nov	
7	Said Abdul Jawad	MCIT - Prov. Director	Pul-e-Khumri	12-nov	
8	Haji Fazal Rahman Shinwari	MCIT - Prov. Director	Kunduz	17-nov	
9	Shah Mohammad	MCIT - Prov. Director	Kandahar	18-nov	
10	Khodaydad Kayhan	MCIT - Prov. Director	Mazar-e-Sharif	20-nov	
11	Alam Shah Qaderi	MCIT - Prov. Director	Jalalabad	19-nov	

## NON-ICT PUBLIC SECTOR

Non-ICT Public Sector: 14 Kills					
1	Woudod Safi	MoPH/HMIS	Kabul	28-oct	
2	Chris Bishop	MoPH - Senior Technical Advisor	Kabul	28-oct	
3	Yaqoob Azimi	MoPH/HMIS	Kabul	28-oct	
4	Wafi	MoPH - Director of ICT Department	Kabul	28-oct	
5	Ahmad Shah	MoE - Director of ICT Department	Kabul	29-oct	
6	Tariq Ismati	MRRD - Deputy Minister	Kabul	13-nov	
7	Mukhtar Ghafarzoy	MRRD - Policy Advisor	Kabul	13-nov	
8	Zabiullah Barekzai	MoF - ICT Director	Kabul	1-dec	
9	Samiullah Osmani	MoHE - MIS Director	Kabul	1-dec	
10	Khal Mohammad	MAIL - Provincial Director of ICT	Pul-e-Khumri	12-nov	
11	Khanzad Gul Salarzai	MoE - IT Officer	Kunduz	18-nov	
12	Eng. Abdul Basir Aieni	MRRD - Provincial Director	Mazar-e-Sharif	20-nov	
13	Amanullah	MoF - IT Director	Kandahar	18-nov	
14	Mohammad Kameen Wali	MoPH - Provincial Director	Jalalabad	21-nov	

## UNIVERSITIES

Universities: 2 KIIs				
1	Mussadiq Jalalzai	CS Faculty - Professor	Kabul	4-dec
2	Hamid Rahman Mohmand	CS Faculty - Dean	Herat	11-nov

## DONORS AND EXPERTS

Donors and Experts: 5 KIIs				
1	Catherine Warner	ISAF - TAT Senior Telecom Advisor	Kabul	22-oct
2	Scott Wilson	ISAF - Telecommunications Advisor	Kabul	22-oct
3	Javid Hamdard	Independent Consultant	Kabul	5-nov
4	Latif Jafari	AISA - MIS Reporting Coordinator	Kabul	17-nov
5	Siddharta Raja	World Bank - ICT Policy Specialist	Kabul	27-nov

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