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**Information Communications Technology Support to Reconstruction and
Development: Some Observations from Afghanistan**

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Disclaimer

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Abstract

Recent United States (US) government experiences with failed-state interventions suggests that telecommunications (telecoms) and information technology (IT) reconstruction initiatives continue to suffer from a lack of adequate understanding of the affected nation information culture and telecoms and IT business cultures. A coherent telecoms and IT-related civil-military strategy and plan for intervening nations and responding international organizations (IO) and non-governmental organizations (NGO) is lacking as well and there are no agreed mechanisms and procedures to enable effective civil-military coordination and information sharing among participants and with the affected nation.

National Defense University, Center for Technology and National Security Policy studies suggest that information and IT can significantly increase the likelihood of success in failed-state interventions and subsequent reconstruction if they are engaged from the outset as part of an overall strategy and plan that coordinates the actions of outside interveners and focuses on generating effective results for the affected nation. This paper examines Afghanistan telecoms and IT as a case study of its use as an enabler of sector reconstruction. Some of the successes and related coordination and information sharing challenges encountered by the multinational civil-military responders and affected nation telecoms and IT organizations are illuminated as well.

Background

Information communications technology (ICT) is the merger of Telecommunications and Information Technology. It is a catch-all phrase used by the international community to describe a range of technologies for gathering, storing, retrieving, processing, analyzing, and transmitting information.

ICT is a basic enabler of informal social and economic discourse in the strengthening of civil society and the promotion of economic activity. Advances have progressively reduced the costs of managing information, enabling individuals and organizations to undertake information-related tasks much more efficiently and have introduced innovations in products, processes and organizational structures. ICT enables the generation of new ways of working, market development, and livelihood practices.

The National Defense University, Center for Technology and National Security Policy recently completed a study of using the information revolution to achieve success in stability operations, referred to as the I-Power study. The results of the study suggests that the strategic use of information and related technology can significantly increase the likelihood of success in affected nation cross-sector reconstruction and development if information and ICT are engaged at the outset as part of an overall strategy that coordinates the actions of outside interveners and focuses on generating effective results for the affected nation. This has certainly been the case in business, government, and social arenas in the western world where the information revolution has been a dynamic and positive factor. The combination of technology, information content, and people

schooled in the use of each has reshaped enterprises and activities of all types throughout the world.

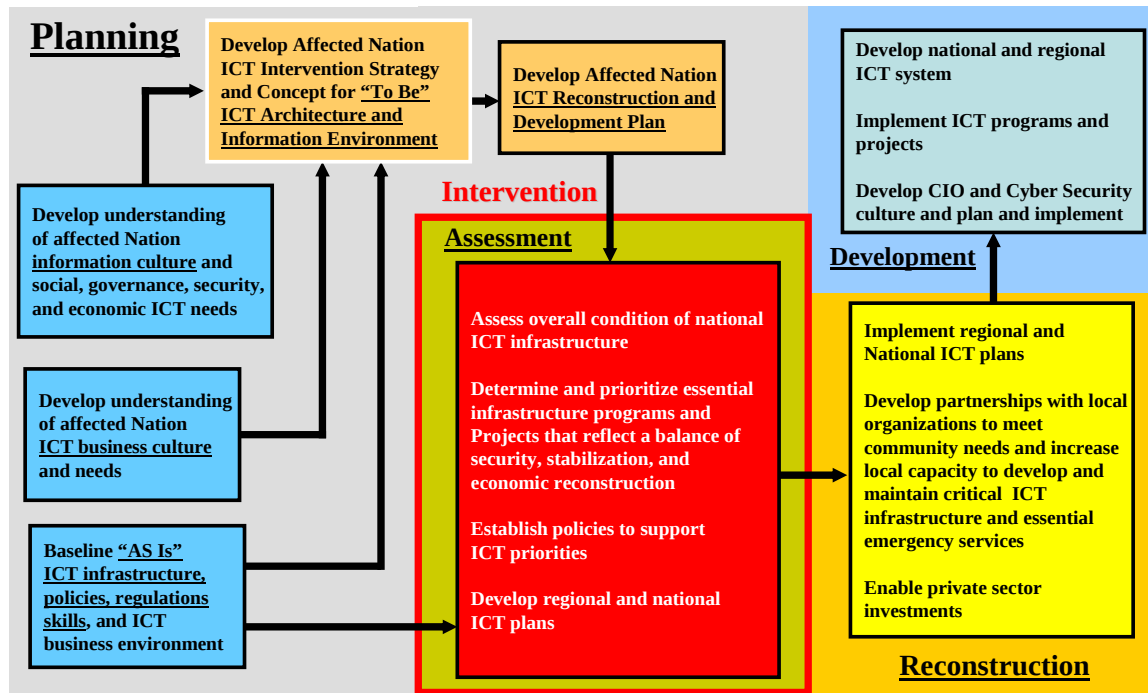


Figure 1 ICT Business Model

An ICT business model along the lines of the one suggested in figure 1 coupled with the smart use of information and ICT could be employed to help create a knowledgeable intervention; facilitate appropriate integration of intervener ICT reconstruction and development initiatives with the affected nation ICT strategy and plans; help organize complex activities, and enable coordination, information sharing, and implementation activities among interveners and with the affected nation, making the latter more effective. Additionally, ICT can be used to link constituent parts of an integrated multinational reconstruction and capacity-building effort, can help multiple sectors simultaneously (e.g., security, governance, education, health, agriculture, finance, and commerce) and can be used to enhance situational awareness of cross-sector reconstruction and development activities.

Experiences from recent US government (USG) and coalition interventions in the Balkans, Afghanistan and Iraq have repeatedly demonstrated that ICT activities supporting stabilization, reconstruction and development operations in the affected nation can be problematic. These activities suffer from a lack of adequate understanding of the affected nation information culture and related ICT business culture. There is no clear mapping of responding stakeholder organizations roles and responsibilities. Program development, project coordination, information sharing and ICT implementation are largely uncoordinated and non-standard. There is no agreed architecture and plan for affected nation ICT reconstruction. A coherent ICT-oriented civil-military strategy and plan for intervening nations and responding IO and NGO organizations is lacking as well and there are no agreed mechanisms and procedures to enable effective civil-military

coordination and information sharing among participants and with the affected nation. Finally, donors and interveners do not consistently view ICT as a high priority need to be addressed early and as an enabler of cross-sector reconstruction and development.

This paper shares some of the findings from a case study of Afghanistan ICT as both a sector and an enabler of cross-sector reconstruction and development. Coordination and information sharing challenges encountered by the multinational civil-military participants in Afghanistan and approaches used to address these challenges are highlighted. Some observations from one of the author's visit to Afghanistan in April and May 2006 are included.

Afghanistan the country

The Islamic Republic of Afghanistan is an area of approximately 652,000 square kilometers and is slightly smaller than the state of Texas, see figure 2. It is a landlocked plateau between Iran and Pakistan that also shares borders with China, Tajikistan, Turkmenistan, and Uzbekistan.



Figure 2 Afghanistan

Afghanistan has long been known as the cross roads of Asia—this is reflected in the country's ethnic and linguistic diversity. High mountains cover much of the country and are part of the Hindu Kush mountain system where small glaciers and year-round snowfields are common.

Afghanistan is one of the world's poorest and least developed nations. Following the years of fighting, roads, power, water, telecommunications, healthcare, and education were disrupted or dysfunctional. The country lacked a functioning government and laws, regulations and enforcement mechanisms. There was widespread unemployment and poverty and still is. Today, unemployment is about 40% and the Afghan economy comes largely from growing poppies and production of illicit drugs—producing over 90% of the world's opium. The latter has raised concerns that Afghanistan is in danger of becoming a full fledged narco-state. Among the most pressing labor problems is the lack of skilled workers and administrators. Corruption and organized crime are significant problems as well and there is a growing insurgency that is fueled by the booming drug economy.

Afghanistan is administratively divided into 34 provinces which are further divided into a 365 districts. Kabul, the capital of the country, is located in east central Afghanistan and is situated at an elevation of about 5,900. The major economic centers are Kabul, Herat, Kandahar, Jalalabad, Khost, Mazar-e-Sharif, and Kunduz. The population of the country is around 30 million (16 million females/14 million males and 45% are under the age of 15 years). About 22% live in urban areas—there are over 3 million living in Kabul alone.

The country is governed under a constitution that went into effect in 2004 but warlords continue to operate and use their militias to maintain control in their areas. Afghanistan is currently led by President Hamid Karzai, who was elected in October 2004. The current parliament was elected in 2005. Among the elected officials are former Mujahadeen, Taliban members, communists, reformists, and Islamic fundamentalists. Additionally, some of the provincial governors are former warlords. Government corruption exists, including allegations of ministerial level involvement in the illegal narcotics trade. The constitution established an independent judiciary. However, no laws may be passed that are contrary to the laws of Islam. Law is administered on an intermittent basis according to a mixture of codified law, Shari'a (Islamic law), and local customs.

Although the Afghan National Police (ANP) are responsible for maintaining civil order, they are viewed by the average Afghan in many areas as a source of fear rather than security—they have been accused of improper treatment of the local population and have been ineffective in controlling crime. There is an absence of visible justice in many parts of the country. The Afghan National Army (ANA) on the other hand is widely considered a nascent success as a multi-ethnic national institution. In the hinterland, local and regional military commanders continue to exercise control and many times, the military need to respond to an incident due to a lack of police ability to respond.

The official languages are Dari (50%) and Pashto (35%), but there are other languages spoken such as Uzbek and Turkmen that are considered official languages in areas in which they are primarily spoken. Religion is the strongest common bond with the majority of the population being Muslim—Sunni Muslims (84%) and Shia Muslim (15%). Healthcare and education are problematic. One in 5 children will die before the age of 5, mostly of preventable diseases. The life expectancy is about 42 years for males and 43 years for females. The average literacy rate is 36% in urban areas (51% for males and 21% for females) and lower in rural areas. The poor literacy rate can create special

challenges for military and civilian reconstruction and development teams dealing with local leaders, warlords and tribal leaders, many do not read or write. 32% of the children are in school but only 3% of the girls attend. Many schools for girls have been burned and teachers' and families of the girls going to school have been threatened and some murdered by the insurgents.

Extremely close bonds exist within the family, which consists of the members of several generations. The family is headed by the oldest man, or patriarch, whose word is law for the whole family. Family honor, pride, and respect toward other members are highly prized qualities. 25% of primary school-aged children work to support the family.

Afghanistan is still largely a tribal culture with a variety of social ills such as poverty, interethnic strife, inequality of women, and widespread thievery, kidnapping, and banditry. Afghan women are still among the worst off in the world: most are illiterate, many have no access to healthcare, and child and forced marriages are common.

Following the removal of the Taliban, international intervention in Afghanistan has been substantial. However, 75% of reconstruction and development spending has been outside of the government of Afghanistan (GoA) channels without formal, centralized oversight and 70% of spending has been in Kabul where only approximately 10% of population is located. This has significantly impacted the ability of the GoA to establish legitimacy outside of Kabul.

The security situation in 2007 is tenuous and will likely impact the ability to conduct reconstruction and development. The anticipated 2007 insurgency Spring offensive may prove to be particularly active and disastrous for reconstruction and development. The violence in Afghanistan has been on the rise; in 2006 it was four times more intensive than it was the year before. Suicide attacks jumped from 27 in 2005 to 139 in 2006 and the use of roadside bombs (Improvised Explosive Devices) doubled. International aid and reconstructions workers have been targeted setting back reconstruction and development efforts in the hostile areas. So far there have been some isolated incidents but no major attacks targeting the ICT infrastructure, probably because the insurgents are using these services. Private sector ICT contractors have had staff kidnapped and murdered and unconfirmed reports suggest that government ICT staff manning Afghan Telecom facilities have been threatened. The security threats are a significant deterrent for contractors, consultants, government workers and related reconstruction and development activities, especially the provinces along the Pakistan border where, for example, ICT reconstruction largely came to a halt the end of 2006.

Afghanistan ICT Environment

After 23 years of conflict, under-investment and neglect by the Taliban, the ICT infrastructure was left in disrepair. The residual, existing ICT culture and skills evaporated—most of the population with the skills left the country during the war fighting years. Hence, there was (and still is) a serious shortage of Afghan leaders, managers, administrators, and technical personnel with 21st Century skills across civil

service, private sector and higher education institutions—business practices and management, project management, Telecom and IT skills, and English language are key areas of concern.

In early 2002, Afghanistan had fewer than 40,000 telephone lines for a population of over 25 million. About 60% of the active lines were provided by a few fixed switching exchanges in Kabul and the rest in the cities of Herat, Mazar e Sharif, Kunduz, and Jalalabad. These exchanges were not however interconnected. In April 2002, Afghan Wireless Communication Company (AWCC) began operation of a stand alone Global System for Mobile (GSM) communications capability that served about 11,000 cellular subscribers largely in the Kabul area but also with some limited coverage in Herat and Mazar e Sharif.

Due to damage to the backbone microwave and cable networks, Afghanistan did not have a functioning long distance network to support national or international service. There were early efforts to try to restore some long distance connectivity and establish international access. For example, a few Very Small Aperture Terminal (VSAT) satellite links were planned to connect the legacy switching exchanges in Kabul with those in the other cities. Limited international access was available using the international gateway owned by AWCC that employed a satellite link to route international calls through Guam. Direct inbound calls to Afghanistan were routed using the +93 country code. International calls could also be made using satellite phones such as Thuraya, Globalstar, Iridium, and International Maritime Satellite (INMARSAT). There were a number of UN and NGO provided VSAT sites that supported humanitarian assistance activities and provided basic voice and Internet access through their own international satellite gateways. Public Internet services were virtually non-existent. The Ministry of Communications (MoC) initially contracted with the private sector to provide some limited Internet services for selected government agencies.

The Afghanistan transitional government established in December of 2001 recognized that ICT would be critical to the success of the planned national elections and to facilitate communications among the central government and regional authorities. It was also recognized as being important to supporting the collection of taxes and customs duties, to establishing a national banking system, and to enabling other political, security, governance, judicial, social and economic recovery actions.

The transitional government moved reasonably quickly to initiate the actions necessary to put a Telecom and Internet policy and ICT strategy and plan in place to allow Afghanistan to become a part of the global information society. In June 2002, the Afghan transitional government appointed a new Minister of Communications and designated the MoC the leadership role to enact policies to create an environment conducive to investment from the private sector. In October 2002, the Minister of Communications published a national telecommunications development strategy that outlined key ICT infrastructure development initiatives and set the conditions for developing an Afghanistan Telecommunications and Internet Policy.

In October 2003, the Telecommunications and Internet Policy was approved. The policy encouraged private investment through the introduction of measured competition; established Afghan Telecom as a state-owned corporation to operate the public sector ICT network with the right to accept private investment; and supported rapid expansion of telecommunications and Internet services at the local level. Additionally, the policy aimed to enable the rapid growth of affordable communications to all of the Afghan people so they may experience the Information Age, wherever they are and whoever they may be and to establish a fully functioning and affordable telecom infrastructure, and to encourage the private sector to grow and take over these networks over time. The MoC objectives included wide adoption of ICT in order to improve all aspects of Afghan life, including education, healthcare, employment and access to information; growth of the local ICT industry in order to foster investment and employment generation; and use of ICT to increase Government efficiency and to effectively deliver improved social services.

In 2005 the GoA published the Afghanistan National Development Strategy (ANDS) that articulated its interim strategy for achieving security, governance, economic growth and poverty reduction. The ANDS five-year strategic benchmark for telecommunications stated that by the end of 2010, a national telecommunications network was to be put in place so that more than 80% of the Afghans would have access to affordable telecommunications, and more than \$100 million US dollars per year would be generated in public revenues. Additionally, it stated that the government would establish a telecommunications regulatory system that assigned the government regulatory responsibility while raising investor confidence and established a public telecommunications backbone, on which the private sector could build, to ensure that the economic and social discourse extended to rural-areas.

The ICT strategy developed by the MoC focused on using the private sector to help jump start the economic recovery through enabling private sector investments in the rapid expansion of mobile voice services and introduction of Internet services (direct and Internet cafes) in the urban areas and on using the government to develop the public sector ICT for governance and making affordable ICT services available to the broader population, i.e., private sector driven by teledensity and return on investments and the public sector driven by governance to the provincial level and teleaccess to the district level first and then overtime access for citizens in all of the 5,000 villages nationwide. There were also a number of parallel initiatives by donors and NGOs to use ICT as an enabler other sector reconstruction, such as, healthcare and education.

A MoC five-year development plan was issued in 2005 and this plan has served as the guiding document for ICT-related initiatives to date. In December 2005, President Karzai signed the Telecom Law that established an independent regulatory body, called the Afghanistan Telecom Regulatory Authority (ATRA), by merging the Telecommunications Regulatory Board and the State Radio Inspection Department of the MoC. On 27 May 2006 the law was published in the Official Gazette making ATRA fully responsible for all regulatory functions in the telecom sector: licensing and compliance, spectrum planning and assignment, numbering, ensuring network

interconnection, promoting competition and consumer protection, among other things. In March 2007, the MoC changed its name to the Ministry of Communications and Information Technology (MCIT) but for discussions in this paper the term MoC will continue to be used.

Afghanistan ICT to date has generated more foreign investment, high-quality jobs, and new tax revenue than any other legitimate sector—a good news story. Foreign investments in ICT exceed \$500 million. The MoC estimates the telecommunications sector today directly and indirectly employs some 30,000 people in Afghanistan. Government revenues from the telecom sector make up about 12% of the total government revenues—rising from less than \$20,000 in 2002 to over \$100 million in 2006 (issuing two GSM licenses brought in over \$80 million alone). By 2010 the government aims to ensure that more than 80% of the Afghans have access to telecommunications services—current MoC estimates suggest that 50-60% of Afghans now live within a coverage area of the Afghan ICT network, i.e., have ability to access. It is also estimated that the number of cellular subscribers will grow about 100,000 per month, increase from about 2 million in 2006 to over 5 million in 2010 and that the ICT sector will contribute more than \$200 million a year in public revenues.

“Default” Afghanistan ICT Architecture

Although an agreed overarching architectural framework for making near term ICT investment decisions does not yet exist, the MoC vision, strategy, and regulatory policies have enabled, with the help of the international community, good progress to be made in the use of ICT to jump start the economy in the urban areas and support early extension of governance to the provincial level and telecoms access for the broader population to the district level. The “default” ICT architecture that has emerged is based on investments and implementation activities of the public sector (donors such as the World Bank and USAID) and private sector investors such as the cellular providers and Internet Service Provider (ISP), and the related Internet Café owners. Additionally, a good public-private sector partnership has served to enable the success of the private sector rapid growth of cellular services and early introduction of Internet services.

As mentioned, in April 2002, the first private GSM operator, AWCC, launched operations and today there are four licensed GSM operators (AWCC, Roshan, Areeba, Etisalat). By the end of 2006, cell phone service grew to more than 2 million subscribers with national and international service offered in the major urban areas. The prices for mobile service have dropped by about 70% between September 2003 and March 2005. The cellular network providers operate their own international gateways. Roaming between GSM networks is offered but prices differ between networks. Some cell phone users have been observed to have separate phones for accessing the different cellular networks. Short message service (SMS) is offered as well General Radio Packet System (GRPS), plug laptop into cell phone to get internet access. Under special cost arrangements with the private cellular providers and the MoC/ATRA, ex-soldiers run Public Call Offices that offer off the street walk in fee-for-service cellular calling.

Ad hoc Internet cafes emerged as early as 2002 in Kabul. The first ISP was licensed in 2004 and today there are some 15 licensed ISPs. Some of the major providers are Ariana Telecom, CeReTechs, Neda, Insta Telecom, New Dunia Telecom, KBI AF (VARIA) and LiwalNet. There are hundreds of privately run Internet cafes around the country—mostly in urban areas such as Kabul, Khost, Jalalabad, and Kandahar.

In 2003 the GoA contracted with China's Huawei and ZTE to implement CDMA switches that today provide wireless local loop service to over 165,000 digital lines in 24 provinces and is growing rapidly. Subscribers have both desktop and handheld versions of CDMA phones—the 800 MHz spectrum is used for CDMA-based WLL and offers limited mobility within the area of coverage. In fact, the CDMA-WLL service competes with the local private GSM providers and calls can be made to and from GSM users via CDMA-GSM network interconnections. Adding a roaming service to the Afghan Telecom CDMA network is under consideration and this would create a public sector CDMA based cellular network that would compete nation-wide with the private sector GSM networks.

The coalition and US Government (USG) interests and investments in Afghanistan ICT reconstruction and development, like previous failed-state interventions, were problematic and in some cases still are. At the outset, there was a general lack of understanding on the part of a number of the civilian and military intervening organizations of the Afghan information culture and related ICT business culture. Donors shunned providing telecom reconstruction funds for public services (largely influenced by the so-called “Washington Consensus” championed by the World Bank) and the USG took a largely hands-off approach to underwriting Afghan telecom despite the obvious need for emergency support following the war. Eventually, as the situation and needs became clear and better understood, these views changed and some of the international community engaged.

The World Bank and USAID provided the MoC funding to help create a public communications network now maintained and operated by Afghan Telecom. This network provides voice, fax, and Internet services to provinces and districts and VTC services to the provincial governors. Funding included an international satellite gateway in Kabul to access global voice, data and Internet services. The World Bank invested \$16.8 million to develop the government communications network (GCN) and another \$3.7 million to rehabilitate the International satellite gateway in Kabul. The GCN provides communications services to support governance to the provincial capital level—governor and key administration elements including in some cases police chiefs. USAID invested \$14.2 million to develop the district communications network (DCN) to extend voice and Internet access to the district level for use by local government administrators and the local population. GCN and DCN serve to enable good governance at the provincial and district levels by helping remote communities and government offices throughout Afghanistan communicate effectively with each other and with the world.

In 2004, the GoA contracted with the American firm Globecom Systems Inc (GSI) to engineer and implement the GCN, DCN and International satellite gateway rehabilitation.

Today, all GCN nodes have been commissioned and the network connects 42 ministries in Kabul and major offices of Kabul city to each other and links the central government in Kabul to the governors of the 34 provinces. A meshed satellite network supported by some digital microwave links provides the network connectivity for GCN. The satellite links support T1 connectivity between the GCN nodes and the network provides voice, fax, Internet, and VTC services to the provincial capitals and key Kabul-based government elements. In regard to the latter, a fiber optic ring, supported by digital microwave links, provides the connectivity in Kabul area for interconnecting the ICT of President, Ministers and Kabul city offices and to interconnect them with the GCN.

Because of funding limitations, GCN service was only extended to the MoC building in the provincial capitals not to the governor and other key offices as originally intended. A program, referred to as the Provincial Governors Communications Network (PGCN), was developed to acquire and implement an ICT capability package to extend services from the MoC building to the governor and other key offices. The US military (Combined Forces Command-Afghanistan) used CERP funds to purchase and implement a PGCN solution package that provides WiMax terminals and related end user equipment to extend GCN voice and Internet services to the governor facilities—5 telephones and 5 computers. The governor still needs to go to the MoC building to use the VTC. The initial CERP funding covered 12 provinces and these provincial governor sites are now operational. Sources of funding are still being explored to equip the governor facilities in the remaining 22 provinces.

The rehabilitated GCN International Satellite Gateway in Kabul was commissioned in June 2006 and provides access to the Hong Kong International gateway for worldwide calling and global Internet access. There are also access links via Afghan Telecom CDMA switches to Pakistan (digital microwave) and Iran (fiber optic cable) to support regional connectivity and calling.

Although there are 365 districts in Afghanistan, only 337 have been funded to receive DCN nodes. By early 2007, a little over 160 of the 337 funded district sites have been commissioned and are connected by a VSAT star network configuration. The network offers district level access to phone, fax and Internet services. At each DCN node a telekiosk arrangement provides access to 5 phones, 5 workstations with Internet access and a fax machine. The average access rate is roughly 256 kbs downlink and 68 kbs uplink. A diesel generator and batteries provide the power for the ICT equipment. The DCN sites are located near district centers so that the local population can come to the site to make a voice call within Afghanistan and internationally and to access the Internet. A small fee is charged for these services (typically 1 Afghani per minute for calls within the district, 5 Afghani's per minute between districts and 25 Afghani's per minute for international calls; Internet access is 20-30 Afghani's per hour).

Of the DCN nodes commissioned, a number of them have been able to generate enough revenue to sustain their operation—largely due to a lack of customers and inability to market the availability of DCN services at the district level: no marketing plans, no signs on the buildings or radio advertisements—many locals do not know the service exists in

their area. Additionally the nodes are located outside of the populated areas and in a protected enclave that does not make it conducive to walk in telekiosk-like service. As a result, a number of DCN sites are only open two hours a day if at all—some only power up if a customer shows up. There have been MoC/ATRA discussions about franchising DCN nodes as a way to develop a more profitable customer base and make DCN a financially viable and sustainable service. It has been estimated that monthly revenues of about \$3,000 would be required for a total cost recovery of operating and capital costs. Cost of fuel alone for the diesel generators is about \$800 per month and is a key factor.

Availability of district communications buildings (usually two buildings, one for the ICT equipment and one for the generator) and physical security concerns due to increased insurgent threats have slowed the implementation of DCN nodes but the MoC/Afghan Telecom are optimistic the remaining nodes will be completed by the end of 2007. However, of the 337 sites programmed for DCN equipment, only 275 have funding for building construction—the funding comes from a variety of sources including: USAID, Provincial Reconstruction Teams (PRT), GoA, UNDP, and Afghanistan Stabilization Program (ASP). Funding for the remaining 62 buildings has not yet been obtained. Delays in funding could impact the ability to complete implementation of the 337 DCN node network by the end of the year. Additionally, funding for DCN equipment and buildings for the remaining 28 unfunded district nodes is yet to be determined.

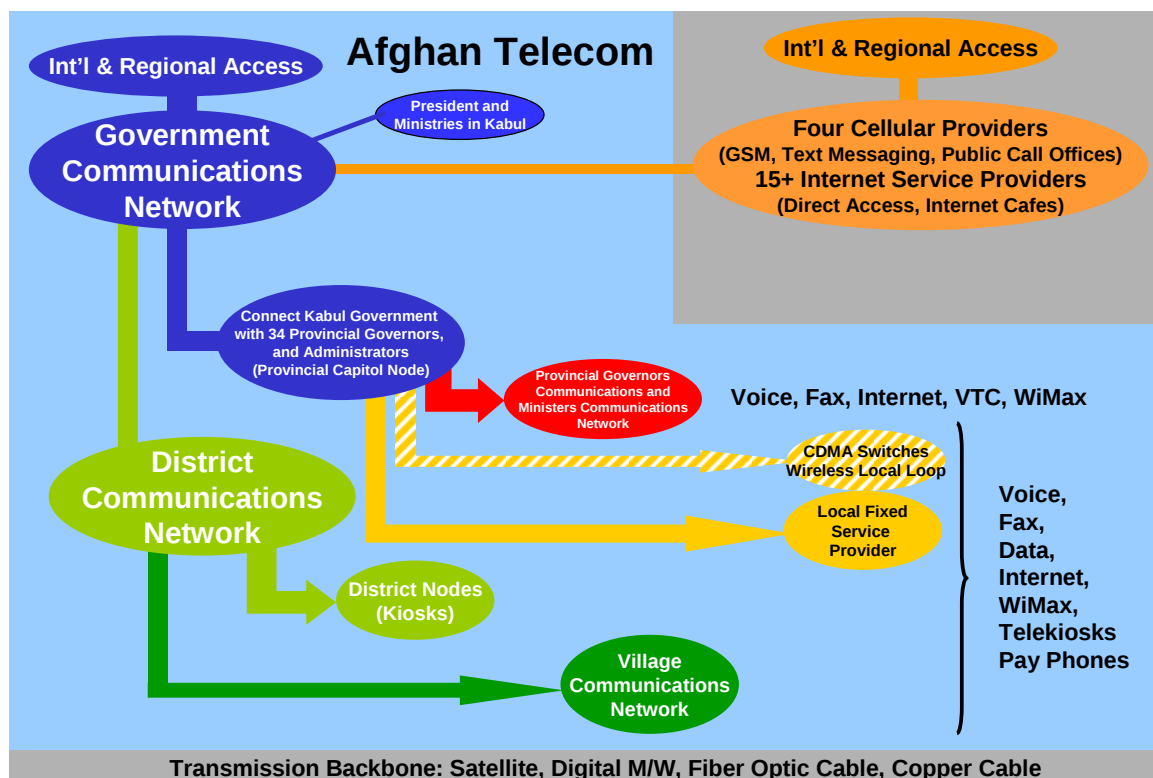


Figure 3 "as is" or "Default" Afghanistan ICT Architecture

GSI installed a softswitch at the GCN hub in Kabul to handle GCN/DCN routing and call setup and tear down. The DCN network interfaces with the GCN network at the hubs in

Kabul. The CDMA-WLL switches are connected to GCN nodes and use the GCN long haul transmission for connectivity and the softswitch for routing and call setup and tear down. The CDMA switches have interfaces with the private sector cellular networks and this arrangement provides the means for calling between the public and private sector networks within Afghanistan. The interconnection of the various networks has served to establish the foundation for evolving to a nationwide networking capability. The “as is” or so called “default” ICT architecture that has emerged is illustrated in figure 3. The GCN/DCN interconnected network arrangement in a sense serves as the “default” nationwide public sector backbone network with international and regional (Iran and Pakistan) access. There are plans for additional interconnections with the ICT networks of other countries bordering Afghanistan.

There are some legacy digital switches providing local voice services and some 300 pay phones in Kabul. There are few other legacy digital switches and pay phones in a couple of the other larger cities such as Herat and Mazar e Sharif. These elements interface either CDMA switches or the GCN as part of the public sector network.

In 2005, the government approved a decree to transfer the MoC’s public sector ICT network and operations to a corporatized public company, Afghan Telecom, who is now responsible for providing basic public sector telecommunications services across the country. MoC has about 20% share in Afghan Telecom and opportunities are being pursued to sell this interest to the private sector. Plans are also in place to privatize Afghan Telecom, the timeframe for this action is under consideration by MoC/ATRA.

As part of the MoC/Afghan Telecom/ATRA objective to extend ICT services to the broader public and in turn create investment and job opportunities consistent with approved Telecom Policy, licenses are being issued to allow the private sector to establish essentially independent telephone companies that will eventually become part of Afghan Telecom. This initiative is referred to as local fixed service provider (LFSP) program and its main objectives are to facilitate faster roll out of services to small towns and rural areas and to provide investment opportunities for small to medium local investors across the country. It is hoped that the LFSP initiative will result in more than \$100 million in investments, the creation of thousands of new jobs and rural areas receiving ICT services sooner. In May 2006, the first LFSP license (more to come) was granted to Wasel Telecom to implement wireless services in small towns and rural areas in the provinces of Kunduz and Balkh. In February 2007, three additional licenses were issued: one to Shaheen to cover 20 districts in the Logar, Pakty, and Paktika provinces and one each to Ertibat and Watan to provide services in five districts of Hirat province. The LFSP providers can offer services using the 900+1800 MHz spectrum. The means by which the LFSP networks interconnect with Afghan Telecom and/or the GSM networks is under consideration. They could access the GCN network similar to the means used by the Afghan Telecom CDMA switches or interconnect directly with the CDMA switches as is the case for the GSM network interconnects or the LFSP networks could interconnect with the private cellular networks. Additionally, the LFSP can have their own international gateways or can use the GCN gateway as part of the Afghan Telecom suite of capabilities.

A contract for a national fiber optic network along the national ring road that connects the major population centers around Afghanistan was awarded to ZTE Corp the end of 2006. In addition to the planned fiber ring, the private cellular phone providers are already implementing digital microwave links along the same ring road and to urban and other areas. The fiber optic network and digital microwave links could be used to provide alternative means for provisioning GCN/DCN, GSM and other connectivity thus allowing an eventual migration of the satellite based GCN/DCN connectivity from the costly VSAT services to more cost-effective terrestrial connectivity. Contracts have also been let with ASTER of India and Sher-Gandhi of Iran/Kabul for fixed line outside plant copper cabling in the cities of Kabul, Mazaar, Kandahar, Jalalabad, and Kunduz. The mix of satellite, fiber, copper cable and microwave transmission links could be combined to form a national backbone transmission capability that could then be used to provision connectivity for both public and private networks and provide a means for also rapidly accommodating surge capacity needs during crises and restoration and recovery of failed connectivity. It could also be used to create a competitive environment for achieving lower cost network connectivity through more openly competing backbone transmission services provisioning.

Rural area ICT coverage is essentially non-existent today. The MoC has proposed exploring low cost and low power solutions for the rural area, referred to as the Village Communications Network (VCN). This is still in the concept phase but a number of vendors have already suggested ICT packages, for example, a solar power run wireless data communications capability that allows customers wireless access to the Internet and uses Voice over IP (VoIP) for voice service. It is envisioned that the VCN would be an extension of access to DCN voice and Internet services for the rural areas and that the ICT capability packages would be interconnected to the DCN network but this is yet to be determined. Funding for part of the extension of services to rural areas will likely be supported by the Afghan Telecommunications Development Fund (TDF). This is a fund designed to support rural communications and is derived from a 2.5% tax on the cellular providers' revenues. Through a US Trade and Development Agency (USTDA) grant, the ATRA is soliciting a proposal to hire a consultant to recommend the best usage of the TDF to provide rural communications.

The private cellular companies operate on a pre-paid phone card basis where as Afghan Telecom has been operating on a centralized billing (post-paid) basis and this has proven to be problematic for them due to an inadequate centralized billing system and an Afghan culture that believes government run services should be free. A centralized billing system has been acquired and commissioned for use by Afghan Telecom in order to improve revenue collection. Additionally Afghan Telecom plans to introduce pre-paid service as well.

A USAID funded CODAN HF Radio network links communications among the Kabul-based Afghan government and its 34 provincial governments. Until the GCN network became operational, this was the primary means for supporting governance and emergency communications to the provincial capital level. It is still operational today.

There are over 100 VSAT-based sites managed by NGOs to support other NGOs. Additionally, IOs and NGOs are employing innovative uses of Telecommunications and Information Technology to enable sector development such as healthcare and education. For example, in the healthcare area, Partners in Technology International (PACTEC) implemented a VSAT link, LAN and workstations throughout the Cure International Hospital in Kabul to provide doctors and nurses and other medical staff Internet access for research and access to reference material, to facilitate lab work such as remote tissue analysis, to support reachback to subject matter experts for consultation, and other electronic-Healthcare (eHealthcare) uses. Personal Digital Assistant (PDA) with medical diagnostic software tools have been provided and are being used by the doctors. Updates can be downloaded from the Internet. WorldWide Lab, another NGO, provided a software package for a patient record system for the hospital. The software package automated the processing of patients and recording their medical and payment history including an inventory control capability for the hospital's pharmacy.

In the education area, NGO provided workstations, LAN and VSAT provides Internet access for the Journalism Lab at Khost University. On the other hand, the Computer Science Lab next door has some 20 donated workstations but there is no power operate them, LAN or Internet access arrangement. In Kabul, the NATO "Virtual Silk Highway" project provides affordable high-speed Internet access to staff and students at Kabul University and seven other educational institutions in Kabul. There are partnership and e-Alliance programs between Kabul University and Universities in the US and other off-shore institutions that are part of the Afghanistan eLearning and capacity building programs. But the Universities within Afghanistan are not linked together nor are most of the medical schools linked with local hospitals. The San Diego-Jalalabad Sister City program supports efforts to equip the Nangarhar University and Medical School and elementary and middle schools in Jalalabad with computer labs.

USAID, UNDP, World Bank and other organization capacity building initiatives include the rehabilitation of the Telecoms Training Center and upgrading it to a modern ICT Institute, establishment of 12 ICT training centers throughout the country and the establishment of 6 CISCO networking academies around the country to train Afghans in the use of computers and information technology. University programs are being developed and degrees in Computer Sciences are being offered at the major institutions such as Kabul, Jalalabad and Khost Universities. There are also initiatives to introduce English language training and Business Management programs.

The judicial system is exploring e-Solutions and databases, the Ministries are exploring the use of e-Government. Given the high risk security environment, MoC and the private sector are exploring alternative means for financial transactions such as the use of cell phones for electronic funds transfer, e.g., G-Cash and e-Wallet solutions. There are other private sector efforts to explore Internet banking and data networks to link banks.

Global Mobile Personal Communications by Satellite (GMPCS) is available in Afghanistan but is not used by the common Afghan consumer. The users tend to be

foreign military and government elements, NGOs and foreign business representatives. Systems that have been used are Globalstar, Iridium (used by USG elements), Thuraya and INMARSAT. MoC/ATRA has issued licenses to Thuraya to operate throughout Afghanistan.

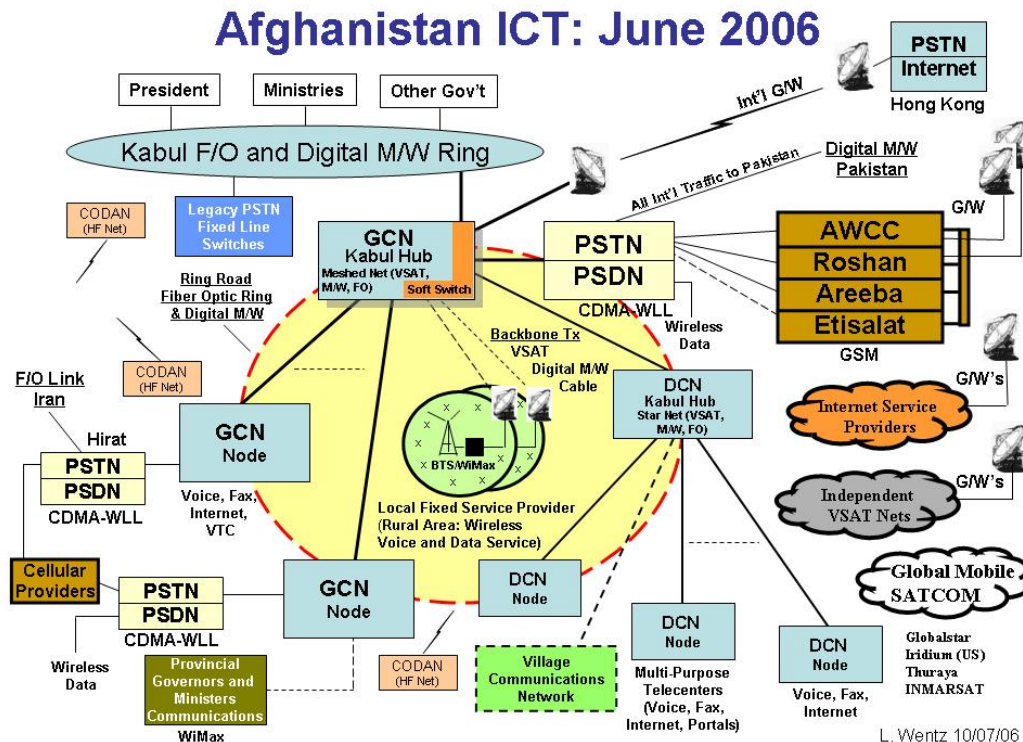


Figure 4 Afghan ICT “as is” Baseline

Figure 4 is a high level systems architecture representation of the “as is” Afghanistan ICT as of June 2006 timeframe. The PGCN (12 ICT capability packages have been implemented) and LFSP (one contractor setting up a network and three preparing to do so soon) have now become active elements of the network. The Village Communications Network is still in the concept stage but initiatives such as LFSP are beginning to reach out to address some of the rural area needs. Cellular service is also starting to reach some rural areas.

Although not discussed in this paper, independent ICT networks are being established by the Ministry of Defense and Ministry of Interior to support the Afghan National Army (ANA) and Police (ANP) respectively. These networks use a mix of fixed satellite-based VSAT networks, tactical military ICT capabilities, GSM cellular, a digital trunked radio system [TETRA (Terrestrial Trunked Radio)], and other fixed and mobile ICT capabilities. Sometime in the near future, there will be selected access to GCN/DCN.

Finally, the lack of reliable electric power for ICT continues to be a major issue. Generators are currently the primary power source for ICT equipment with battery backup. The private sector cellular networks operate 24x7 and use a mix of solar power, generators and battery backup. The GCN operates its nodes 24x7 using diesel generators

for power and batteries for backup. The DCN nodes use generators and battery backup but generators are difficult to maintain, generate a lot of pollution and the fuel to run them is expensive by Afghan standards so many DCN facilities do not operate 24x7. The DCN nodes tend to operate as an on demand service and therefore do not operate 24x7, only active a couple of hours a day or only turned on when a customer needs to use the system. In an attempt to provide a lower cost power solution for DCN nodes, the US military has used CERP funds to purchase and implement solar power for 35 DCN nodes (ZTE is the contractor). Positive results from this effort could influence a more general replacement of DCN generators with solar power.

There is also a lack of attention on the part of the users of ICT to consider the use of low power ICT equipment and power savings procedures to reduce the demands for power. Since there is no national power grid in Afghanistan, a need exists to explore the use of a mix of alternative power sources to reduce pollution caused by generators and is less costly to operate and maintain. Alternative power sources such as solar, small wind, and micro-hydro are being explored.

Coordination in information sharing

Afghanistan: The Challenge

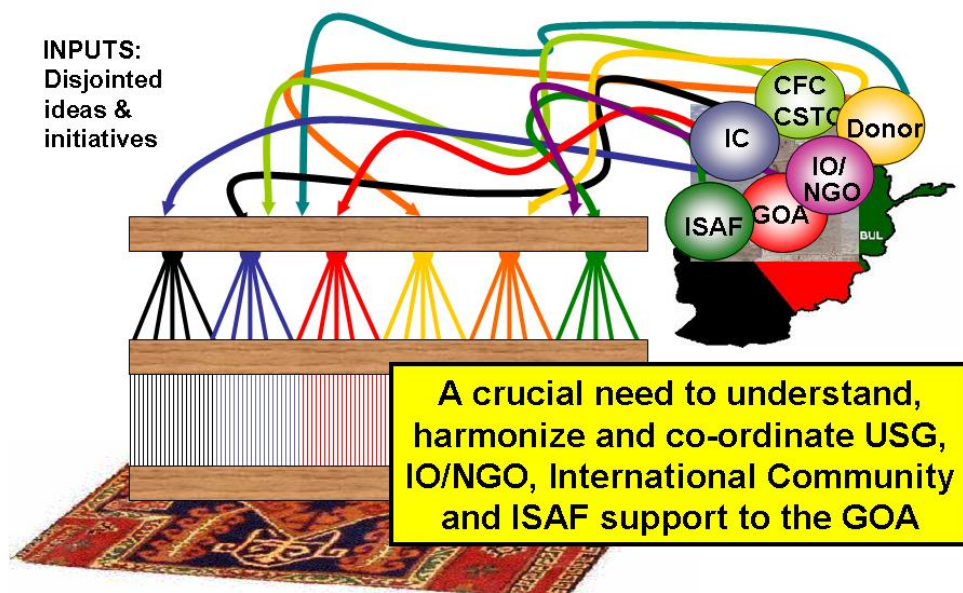


Figure 5

There was (and still is) no clear mapping, see figure 5, of responding stakeholder organizations [e.g. the US Embassy, US Agency for International Development (USAID), coalition military, International Security Assistance Force (ISAF), coalition civilian partners, IOs and NGOs and the Government of Afghanistan (GoA)] roles and

responsibilities, particularly in the area of ICT reconstruction and development. Additionally, there are no agreed ICT mechanisms and processes in place for synchronizing and coordinating multinational actions and information sharing—ICT program development, project coordination, information sharing and implementation are and continue to be loosely coordinated, ad hoc, and in some cases non-standard, especially across Afghan ministries. Coordination and information sharing is largely personality driven—the right persons at the right place and the right time with the right attitudes.

Given the military is driven by a culture of “plan we must” and the civilian community by one of “plan if we can,” there were obviously various versions of draft and approved plans developed by USAID, United Nations Development Program (UNDP), World Bank, NGOs, Combined Joint Task Force-76 (CJTF-76), Combined Forces Command-Afghanistan (CFC-A), Combined Security and Transition Command-Afghanistan (CSTC-A was formerly the Office of Military Cooperation-Afghanistan, OMC-A), ISAF, PRTs, and others but there was no coherent, holistic plan and the degree to which the independent plans were coordinated, synchronized and situation awareness shared differed among participants and in general, was problematic. Even among the USG civilian and military participants, where various ad hoc mechanisms were employed to facilitate coordination and integration, there were interagency related challenges making it difficult to produce an agreed coherent, holistic plan for reconstruction including the ability to share a common picture of civil-military reconstruction and development.

Coordination and information sharing among responders and with the Afghans remains a challenge. The lack of standard formats for data poses significant hurdles to sharing. Free-form text documents make timely roll-up and data-mining efforts nearly impossible. Military data tends to be classified and the declassification process is a challenge and the lack of relational database management systems does not make it any easier—process tends to be slow and risk averse. When sharing works it tends to work largely due to the personalities of key personnel on the ground not by institutional policies, procedures and ICT support capabilities such as collaborative information environments, shared web portals, common GIS databases and shared civil-military situational awareness.

Ad hoc approaches continue to be the means to an end to try to improve operations and actions on the ground: liaisons, coordination teams, special ad hoc groups, such as, the Afghanistan Reconstruction Group (ARG) at the US Embassy in Kabul, reachback groups, multiple in country civil and military liaisons with Afghan Ministries, embedded subject matter experts in ministries, multiple efforts to develop GIS packages and web portals (e.g., UN, USAID, ISAF, US Army Corps of Engineers, DoD).

One of the more successful efforts to facilitate ICT coordination and information sharing in Afghanistan was initiated by the office of the Senior Telecom Advisor (STA) in the ARG—the first STA arrived in October 2005 and left in October 2006. Some of his initiatives offer a number of best practices to consider for future operations as well as on-going operations in Afghanistan. The STA was designated by the Ambassador to be the

principal US Embassy spokesperson for ICT matters and was the US liaison with the Minister of Communications.

In order to create a cooperative environment, he first established a US integration team, referred to as the I-Team, that consisted of US ICT representatives from the Embassy, USAID, and the US military. Over time, the team was expanded to include ISAF, the GCN/DCN contractor GSI, and BearingPoint experts embedded in the MoC and ATRA. I-Team meetings were held several times a month to share and coordinate ongoing ICT activities and discuss challenges and approaches to overcome them. Additionally, two reachback capabilities were created to build social networks to coordinate and share information on important ICT related issues and actions and to seek advice, assistance, and best practices. One group supported USG-only activities and included the US I-Team members, DoS, USAID, ARO, NDU, and other USG elements in CONUS. This group held weekly teleconferences. A second group consisted of US industry volunteers that had an interest in helping Afghans and Afghan ICT be successful and they were engaged to seek advice and best practices and mentoring support for Afghans and related ICT initiatives. This group held a teleconference about once a month.

There was also an STA-led effort to try to get the GoA to set up an I-Team led by the MoC ICT directorate to bring together ICT reps from the MoC, Afghan Telecom, Ministry of Defense, Ministry of Foreign Affairs and Ministry of Interior to discuss ICT initiatives and to share and coordinate ongoing activities and discuss public and private sector, ANA and ANP challenges and approaches to overcome some of the emergency services ICT challenges. It was envisioned that the USG and GoA I-Teams would meet to coordinate and share information. The MoC ICT directorate agreed to try to set up an I-Team but it never really happened.

The STA, in cooperation with ASD NII and US Navy SPAWAR, set up an Afghanistan-ICT portal as way to openly share ICT related information and inform the community on related activities, issues and opportunities. It was to be a repository for all relevant ICT documentation and serve as an electronic library with links to other key web sites such as the Afghan MoC, USAID, UN and others. Chat room capabilities were also offered to facilitate collaboration and coordination among those in different geographic areas and time zones. Unfortunately, the portal never realized its expectations. There were other databases such as USAID's SharePoint reconstruction database, UN Afghanistan Information Management System (AIMS), and ISAF's Afghanistan Country Stability Picture (ACSP) GIS database. The US Army Corp of Engineers was tasked by the Ambassador and US military commander to develop a Afghanistan common operational picture for reconstruction which was subsequently rolled into the ISAF ACSP effort. None of the databases tracked ICT activities.

The way ahead

Although ICT has been a major success story, much remains to be done to make it a viable and robust network to support security, governance and other service needs. The Afghan ICT network is fragile and much of its potential is still to be realized. The

telecoms has limitations in effectively supporting emergency response services, e.g., during riots in Kabul the end of May 2006, the cellular network overloaded. Nationwide coverage and service quality and capacity are marginal. Data strategies and services are inadequate to support e-Solutions and broader community access and use of the Internet. Cyber security is a major problem, lack virus and spyware protection, intrusion detection-protection, firewalls, and the government unable to effectively control use of pirated software and hardware and in appropriate surfing of the Internet. There are no cyber laws or enforcement mechanisms. A Computer Emergency Response Team (CERT) is planned but not implemented. Most Afghan ministries have minimal IT organizations and implementation of internal IT capabilities is uncoordinated and non-standard. There is a lack of a “Chief Information Officer (CIO) Culture” (business processes, standards, best practices) and a very thin layer of ICT competence and skills in the workforce. Additionally, there is no coherent International (or USG) strategy and approach to supporting Afghan ICT development plans.

The USG needs to take a leadership role to promote support of the Afghan ICT evolution. To do this there is an urgent need to create a coherent USG investment strategy and plan that supports the GoA plans to use ICT to enable economic activity in all sectors and improve governance, civil security and social well-being.

Security and governance certainly needs to be high on the priority of ICT opportunities to be considered. For example, MoC, MoD, MoFA and MoI need to create an ICT-based collaborative information environment to facilitate coordination and information sharing. The USG needs to actively pursue enabling (including sources committed to funding) the implementation of the remaining 22 PGCN capability packages to support extension of effective governance to the provincial governor level. Actions also need to be taken to extend GCN services to key ANA and ANP elements to help improve security and emergency response communications. DCN implementation needs to be accelerated and services extended to key local government officials as a means to extend security and governance to the district level. The GoA should be encouraged and the USG prepared to help enable an early introduction of e-Government into ministries for budget development and to automate business functions and processes and to extend and improve GoA provided services to the population in general—contributes to establishing transparency and legitimacy and reduction of corruption as well.

There is a need for the MOC to develop a strategic plan, architecture and enhancement plan for a robust national long distance network and backbone infrastructure to enhance Afghan ICT access, services and performance. Key to this is the need to consider creating a virtual backbone transmission infrastructure and implementation of network operations tools and platforms to facilitate provisioning, managing services, fault recovery and reconstitution, and usage mediation and service billing management.

Improved network robustness, capacity, coverage (rural areas) and services and marketing (e.g., DCN franchisees) need to be explored as a means to make GCN/DCN an effective provider of security and governance services, a competitive service provider including access services in rural areas, and a sustainable and financially viable business.

New initiatives are needed to enable and enhance public and private sector (including incentives) data service offerings nationwide and to enhance Regional and International access and capacity to better position Afghanistan for access to and participation in the global market economic environment.

Need to explore early introduction of e-Commerce solutions such as G-Cash/e-Wallet on cell networks (a possible pilot program is currently being discussed among ATRA, USAID, cellular providers and Afghan National Bank) and Internet Banking services to improve financial transactions, especially in high threat environments.

As part of enhanced capacity building, Afghan ICT needs to be used to enable Internet access for schools, universities, healthcare, hospitals and other sectors. USG, ISAF and others should be encouraged to selectively invest (incentives, pre-pay) in Afghan ICT enhancements to provide coverage and capacity in areas to support their operational needs and then lease back services rather than build own systems—it's a win-win situation for all participants.

In order to more effectively respond to and support emergency services needs, consideration should be given to accommodating embedded emergency ICT services by introducing priority ICT access for 1st responders and key decision makers and network operations tools to accommodate surge capacity and coverage needs and deployable ICT capability packages to support crisis response and ICT recovery and restoration needs.

Efforts need to be accelerated to provide rural area access to ICT services. Consideration needs to be given to actions such as possibly funding a pilot program to test ICT capability package options for the Village Communications Network; facilitate development of incentives for private sector expansion through expanded LFSP licenses that target the rural areas and expansion of the cell network coverage to rural areas; implement a pilot DCN franchise targeting expanded coverage to rural areas; and facilitate provision of micro-financed loans for VCN like capabilities.

Enable the implementation of a “CIO-like” culture. Establish a National CIO (role of MoC could be the National CIO) and CIOs within ministries. Create a CIO council to enhance effective use and standardized ICT capabilities across ministries, to coordinate cross-ministries ICT investments, to standardize business processes including application of e-Government-like solutions, to prioritize ICT spending to support anti-corruption goals, and to oversee and advise on cross-ministries ICT processes that support data sharing and audits of software via development or purchase and data centers. Build capacity through cooperative efforts with educational institutions such as the National Defense University Information Resource Management College CIO program.

Develop and implement a National Cyber Security Strategy and Plan that includes actions such as assigning Information Security Officers, initiating training and awareness programs, establishing an AfghanCERT, adopting cyber-security laws, regulations, standards, and policies and implementing enforcement mechanisms, defining the cyber security organizations, and adopting a prioritized, defense-in-depth strategy.

References

Accenture, Markle Foundation and UNDP, Creating a Development Dynamic, Final Report of the Digital Opportunities Initiative, New York, 2001.

Afghanistan Country Report: Telecommunications, Afghanistan Ministry of Communications, April 2005.

Afghanistan Ministry of Communications Five-Year Development Plan, 25 July 2005.

Afghanistan National Development Strategy (ANDS), 2005

Afghanistan Telecommunications and Internet Policy, November 2003.

Afghanistan Telecom Brief, Ken Zita, April 2004

Afghanistan—Telecoms Market Overview and Statistics, Paul Budde Communication Pty Ltd, 2006

An ICT Primer, ICT for Civil-Military Coordination in Disaster Relief and Stabilization and Reconstruction, Larry Wentz, Defense and Technology Paper 31, Center for Technology and National Security Policy National Defense University, July 2006.

Asia-Pacific Telecommunity Yearbook 2005, Afghanistan country profile.

Assessment of Wireless Telecommunications Trends and Technologies in Kabul, Afghanistan, ANSER, March 2004.

Countering Afghanistan's Insurgency: No Quick Fixes, International Crisis Group, Asia Report N°123 – 2 November 2006

District Communications Network (DCN) Franchisee Business Case Preliminary Recommendation for the MoC, Alan Chelko, USAID Contractor, September 2006.

Information and Communications Technology Policy for Afghanistan, Final Report, Asia-Pacific Development Information Programme, UN Development Programme, October 2002.

I-Power: Using the Information Revolution for Success in Stability Operations, Frank Kramer, Stuart Starr, and Larry Wentz, Defense Horizons 55, Center for Technology and National Security Policy National Defense University, January 2007.

Ministry Sector Strategy (MoC -ANDS WG), February 2007.

Summary of Achievements, Afghanistan Ministry of Communications pamphlet, 2006.

Supporting Afghanistan Reconstruction Through ICT: Challenges and Opportunities briefing, Frank Kramer and Larry Wentz, Center for Technology and National Security Policy National Defense University, December 2006.

The Afghanistan Compact, February 2006.

Transforming Telecoms in Afghanistan, GRIDLINES, PPIAF/World Bank, April 2006.

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Information Communications Technology Support to Reconstruction and Development: Some Observations from Afghanistan

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12th ICCRTS

“Adapting C2 to the 21st Century”



Purpose

- Increase awareness of importance of Telecoms and IT as an enabler of cross sector reconstruction and development

“Information Communications Technology (ICT) is the merger of Telecommunications and Information Technology”

- ICT investment priority needs to be equivalent to roads, water and power



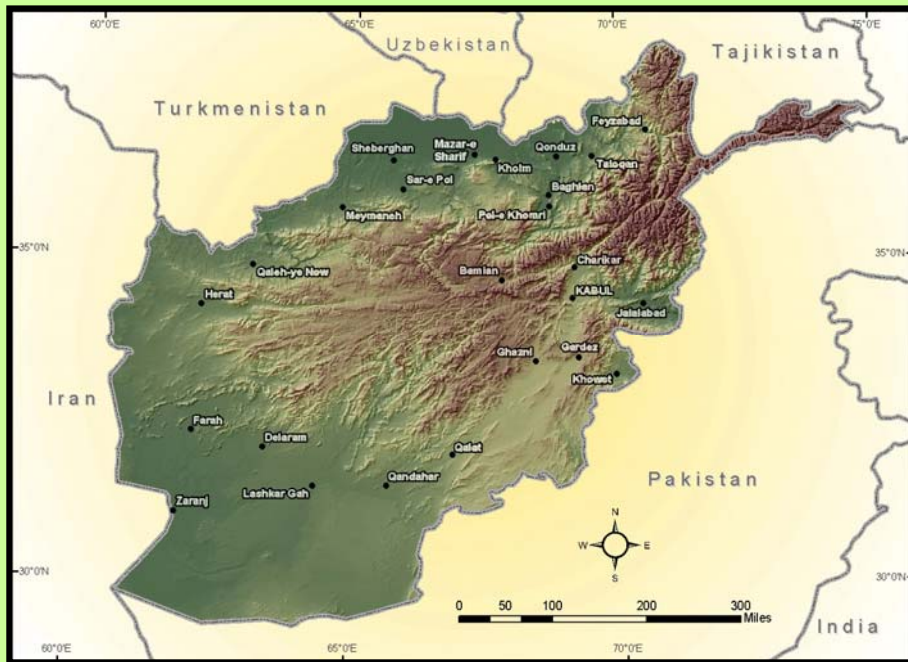
Observations

- Afghanistan ICT a “Success Story”
 - Government of Afghanistan vision and support at highest levels
 - Knowledgeable and experienced Ministers of Communications
 - Vision, strategy and plan
 - Early emphasis on establishing Telecom and IT policies, regulations, laws, and regulatory authority
 - Use of civilian advisors embedded in Ministries
 - Donor assistance for public sector infrastructure and to MoC
 - Good public-private sector partnership
 - Early ICT capacity building initiatives (MoC, USAID, UNDP)

But.....

- There were and still are challenges

Afghanistan



Population : 30 Million (45% under 15 years)

Land Locked country

Size: Slightly smaller than Texas

Literacy: 36% (male: 51%, female: 21%)

Life Expectancy: 42.7 male, 43 female (2004)

Languages: Pashtu (35%) & Dari (50%)

Religions: Sunni Muslim (80%) & Shia Muslim (19%)

GDP (per capita): \$800 (2004)

Unemployment Rate: 40%

Industry: small-scale production of textiles, soap, furniture, shoes, fertilizer, cement, hand-woven carpets; natural gas, oil, coal and copper

Agriculture: Opium poppies, wheat, fruits, nuts, wool, mutton, sheepskins, and lambskins

Arable Land: 12%

Minerals and Resources: Natural gas, petroleum, coal, copper, chromite, talc, barites, sulfur, lead, zinc, iron ore, salt, precious and semiprecious stones

Currency: Afghani (45 to 1 U.S. \$)

Banks: 6 Private commercial banks in Kabul



Afghanistan End of 2001



- Telecommunications infrastructure destroyed
- Roads, power, water, health care, and education disrupted or dysfunctional
- Lacked functioning government and laws, regulations and enforcement mechanisms
- Management, administration and technical skills left country
- Lacked an Internationally agreed ICT strategy and plan for reconstruction and development including a national support strategies and plans
 - At the outset of intervention
 - Donors shunned providing telecom reconstruction funds for public services
 - Influenced by “Washington Consensus” championed by the World Bank
 - USG took a largely hands-off approach to underwriting Afghan telecom
 - World Bank and USAID eventually invested in public sector ICT
- Lot’s of International civil-military responders
 - Coordination and information sharing problematic



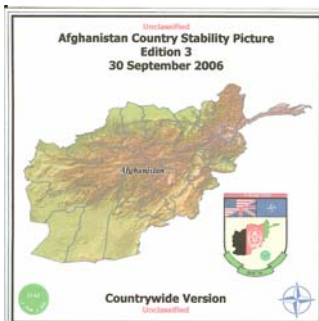
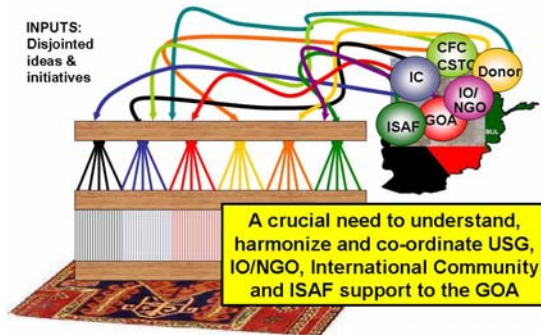
Afghanistan Transitional Government: ICT Vision December 2001



- ICT will be critical to
 - Success of planned national elections
 - Facilitate communications among the central government and regional authorities.
- Recognized as being important to
 - Supporting the collection of taxes and customs duties
 - Establishing a national banking system
 - Enabling other political, security, governance, judicial, social and economic recovery actions.

Nature of the Challenge

Afghanistan: The Challenge



- Coherent ICT investment strategy for reconstruction and development problematic
- Civil-Military coordination and information sharing problematic (not a technology issue)
- Common shared situation awareness for reconstruction and development (especially ICT)
- Force protection complicates conducting reconstruction and development activities
- Need to manage expectations



Afghanistan Environment June 2006



- A weak but functioning government
 - With elected officials but corruption and legitimacy challenges
- Peace and stability fragile
 - Insurgency on the rise
- Establishing legitimacy and transparency a challenge
 - 75% of development spending initially outside of government channels
 - 70% of spending in Kabul but only 10% of the people live there
- Lack leaders, managers, administrators, and technical personnel with 21st Century skills
 - Business practices and management and project management
 - Telecom, computer and English language



Afghanistan ICT June 2006

- Telecommunications and Internet Policy approved October 2003
- Comprehensive Telecom law passed in 2005
- Afghan Telecom Regulatory Authority (ATRA) created in 2006
- International involvement
 - ICT Investors
 - World Bank, USAID and CFC-A CERP and PRTs
 - CSTC-A for MoD/MoI (ANA/ANP)
 - UNDP, World Bank, and USAID initiatives
 - Advisors in ministries and agencies (e.g., MoC, Afghan Telecom, ATRA)
 - Capacity building: Univ Computer Science, 6-CISCO academies, 12-ICT Training Centers
- Strong demand for telecom services
 - In 2002 fewer than 40,000 telephones working nationwide (not interconnected)
 - June 2006 over 1.4 million subscribers and growing rapidly
- Telecom sector has attracted more private investment than any other sector
- Estimated that over 40,000 jobs have been created in the telecom sector
- Largest single legitimate revenue producer (over \$100 M in 2006)



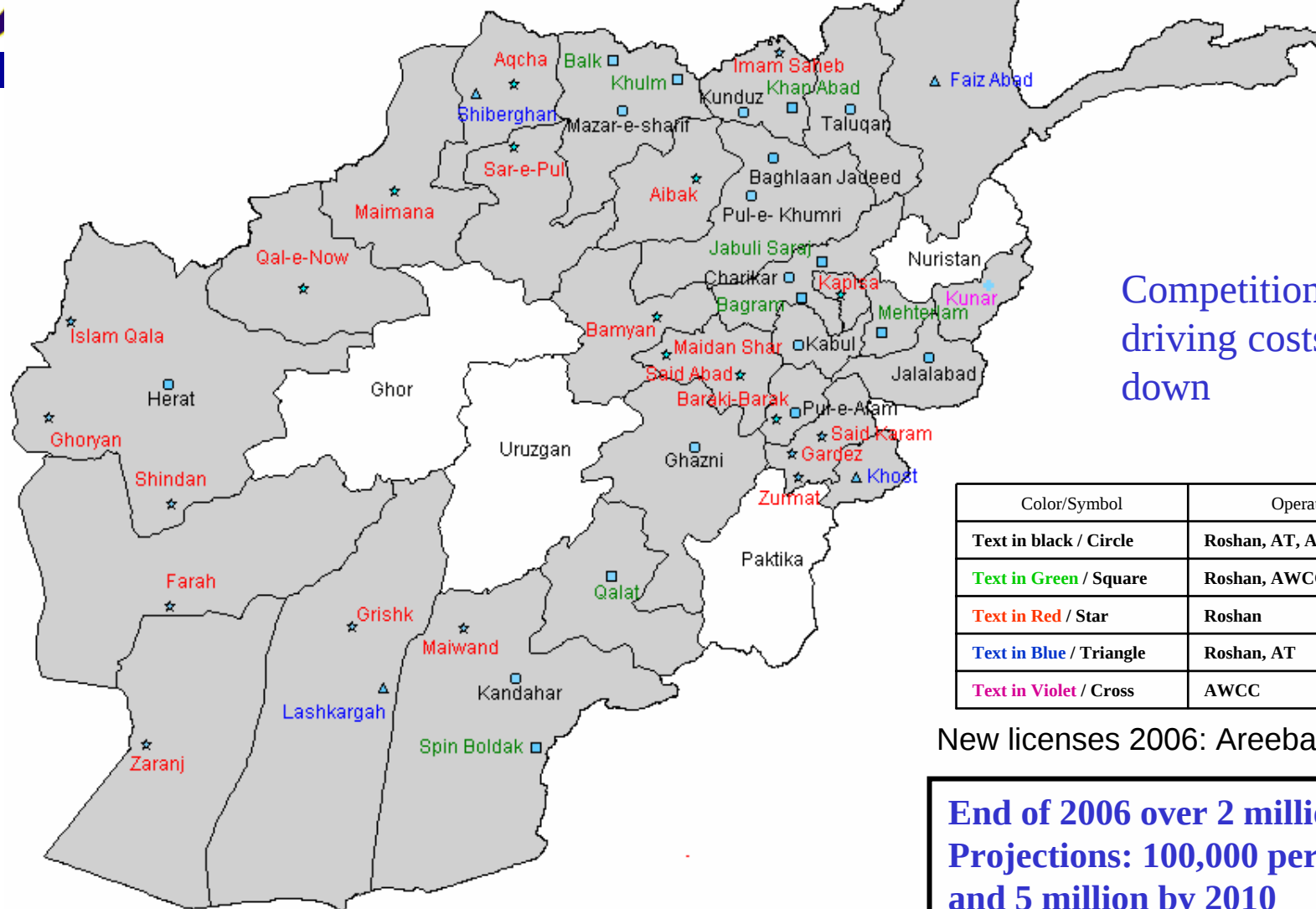
MoC ICT Investment Strategy



- Private sector
 - Mobile access and services to major urban areas
- Government
 - Backbone services
 - Fixed mobile services (wireless local loop) in major urban areas
 - Service provisioning at district level
 - Selective extension of access to services to rural areas



Afghanistan ICT – April 2006



Competition driving costs down

Color/Symbol	Operators
Text in black / Circle	Roshan, AT, AWCC
Text in Green / Square	Roshan, AWCC
Text in Red / Star	Roshan
Text in Blue / Triangle	Roshan, AT
Text in Violet / Cross	AWCC

New licenses 2006: Areeba, Etisalat

End of 2006 over 2 million users
Projections: 100,000 per month
and 5 million by 2010

April 2006: 50 out of every 1,000 Afghans are connected

Private Sector Services



Khost Internet Cafe

- Internet Service Providers (ISPs)
 - Over 300K users
 - Hundreds of Internet Cafes
- Private industry and NGO VSAT networks
 - Reconstruction teams
 - Humanitarian assistance
 - Education/Healthcare
- Public Call Offices
 - Cellular fee-for-service
- Global mobile SATCOM
 - Globalstar, Iridium, Thuraya and INMARSAT



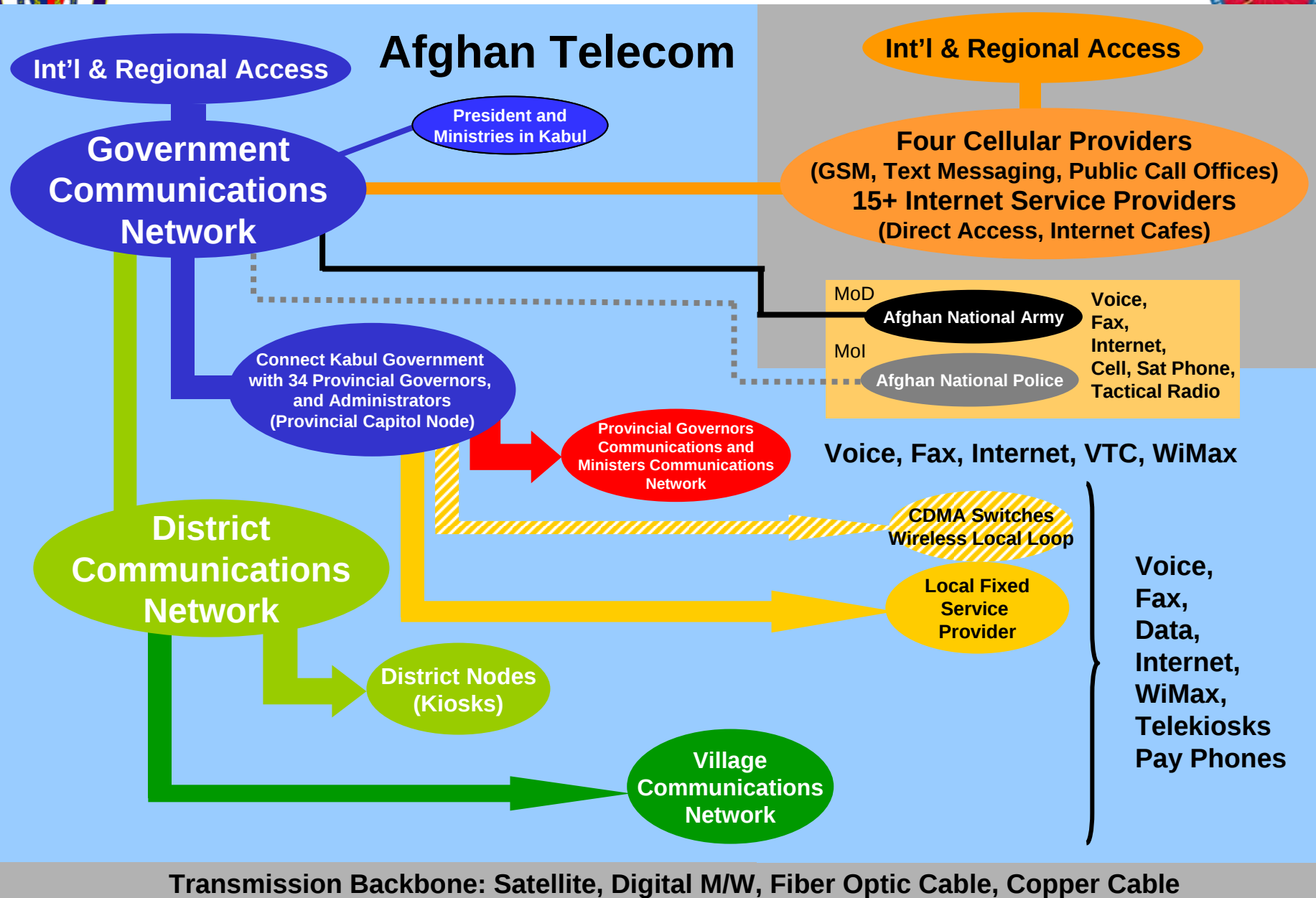
ICT Environment--Afghanistan



- Government use of ICT increasing
 - Government and District Communications Network (GCN/DCN) being implemented by MoC and operated by Afghan Telecom
 - MoC owned Afghan Telecom corporatized
 - To be privatized in near future
 - National fiber optic network around ring road contracted
 - Independent ICT networks being established by MoD and MoI to support the Afghan National Army (ANA) and Police (ANP)
 - Both fixed satellite-based networks and mobile tactical capabilities
 - Use of GSM cellular and access to GCN services
 - Ministries implementing independent IT networks



"Default" Afghanistan ICT Architecture





ICT Environment--Afghanistan



- ICT sector growth more than voice
 - Wireless data, Internet and e-Solutions
 - Internet access and coverage in all major urban areas
 - Internet Service Providers
 - » Direct access and Internet Cafes
 - CDMA wireless local loop Internet/data access
 - » Trial city-wide service offering in Kabul
 - Exploring Internet banking and data networks to link banks
 - Exploring e-Government for Ministries
 - Exploring expanding Internet to schools and Universities
 - Local Fixed Service Providers in smaller towns and villages
 - Wireless voice, data and Internet access
 - Cell phone functionality expanding
 - SMS: Text messaging
 - GPRS: Connect laptop to cell phone to access Internet
 - Exploring use of cell phones for financial transactions
 - G-Cash, CelPay, Smart Money like capabilities--Cell phone wallet



ICT Environment--Afghanistan



- Preliminary steps for broader ICT use undertaken
 - Satellite and Microwave long distance networks deployed nationally
 - Expanding Regional interconnections and International capacity
 - Contract for a national fiber optic network
 - Ministries introducing ICT
 - Largely separate and independent solutions
 - ICT being selectively introduced into education, health care, and other sectors but not as an integrated and coordinated approach
 - Largely private sector and NGO initiatives
 - MoC/Afghan Telecom expression of interest proposal to franchise operation and management of DCN nodes
 - Establishing modern ICT Institutes for capacity building
 - CISCO academies, ICT training centers, University programs in computer science and telecoms



Making Progress But Not Without Challenges

- Public and Private ICT infrastructure fragile and business processes weak
 - Telecom network
 - Ability to support emergency response
 - Cell network overloaded during May 2006 riots in Kabul
 - Quality and capacity marginal but getting better and costs coming down
 - Coverage largely urban areas, little to no coverage in rural areas
 - Data strategies and services inadequate to support eSolutions and broader user community access to and use of the Internet
 - Security issues with growing Afghan Critical National Infrastructure
 - Cyber security
 - » Virus and spyware protection, intrusion detection-protection, firewalls
 - » Control use of pirated software and porn surfing by gov't employees
 - » CERT, cyber laws or enforcement mechanisms
 - Physical infrastructure and key personnel protection
 - » Insurgency is growing and threatening personnel on government facilities but not attacking infrastructure
 - » Criminal elements steal equipment
 - » 24x7 protection is over 20% of the cost of doing business in private sector
 - Most Afghan ministries have minimal IT organizations
 - Implementation of internal capabilities is uncoordinated and non-standard
 - Lack “Chief Information Officer Culture” (business processes, standards, best practices,..)
 - Very thin layer of competence and skills of ICT service providers and users



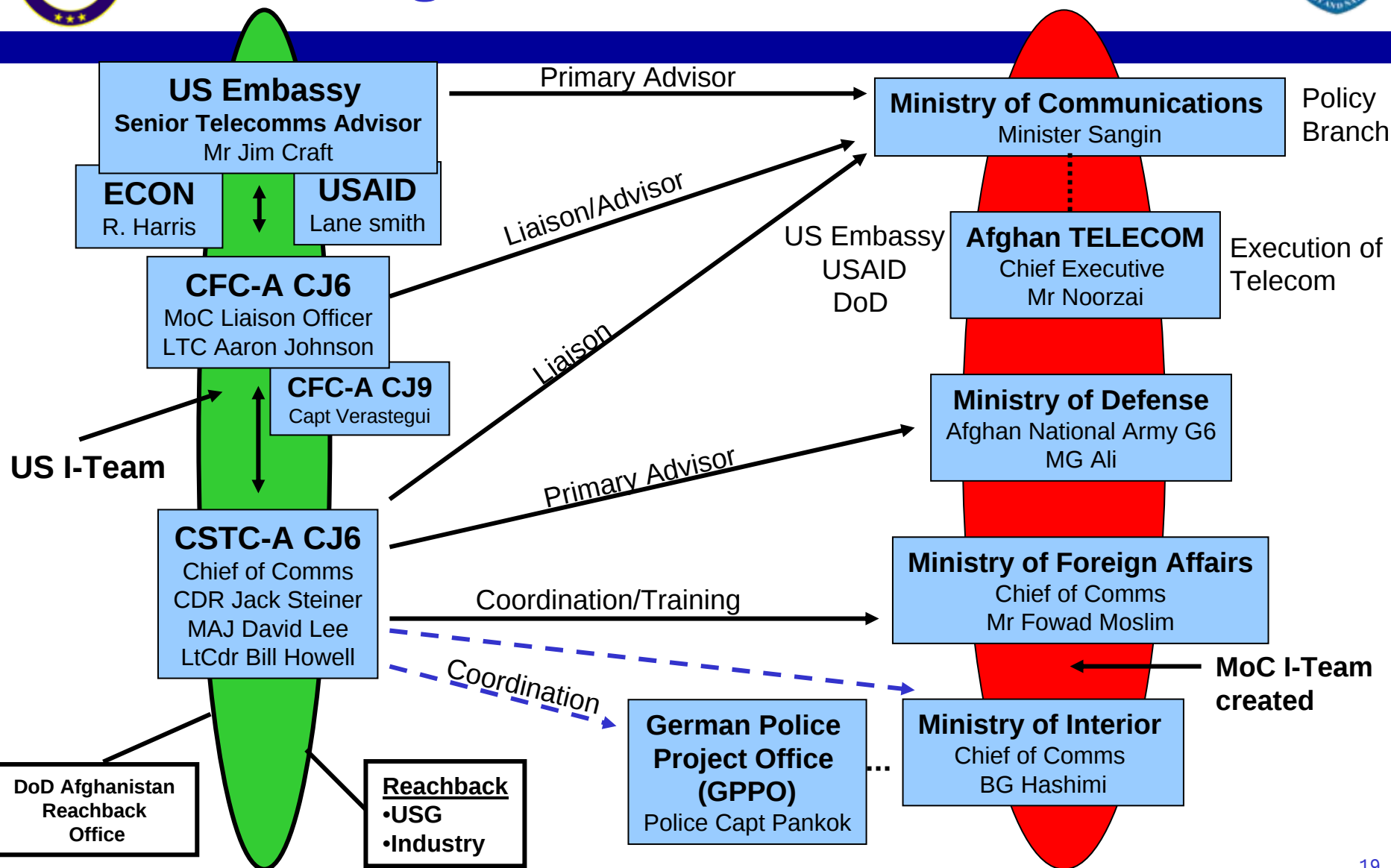
Afghanistan Environment June 2006

- Much remains to be done to make it a viable and robust network to support security, governance and other sector needs
 - Need a coherent International strategy and approach to supporting ICT development and its use as an enabler of cross-sector development
 - Currently driven by cylinders of excellence for sectors
 - Coordination and information sharing among responders and with GoA remains a challenge
 - Lack a shared common operational picture for ICT reconstruction and development
 - Sharing among US Embassy, USAID, US Military and others varies and still is a challenge
 - Was working for ICT sector until rotation of civil-military personnel
 - Ad hoc approaches employed to try to improve
 - Liaisons, coordination teams, reachback groups, portals, embedded SMEs in ministries, USACE developing a shared common operating picture for development (USG, UN, ISAF, GoA stakeholders)



ICT Coordination Relationships

Afghanistan: June 2006





Some Useful Next Steps

- **ICT support for governance and security**
 - Fund and implement the remaining 22 provincial governors communication network
 - Extend GCN service to provincial police chiefs
 - Extend DCN services to district administrators and police
 - Enhance robustness and performance of GCN/DCN
- **Improve ICT access and use for education and healthcare**
 - Implement pilot programs to extend ICT to rural areas
 - Digital solar village like capabilities
 - Market and enhance DCN services
 - Improve local marking at District level
 - Pilot option to franchise DCN nodes and services
 - Wire up campuses and connect Universities via Internet
 - Link University Medical Schools and Hospitals via Internet
 - Link Hospitals and Healthcare centers via Internet
 - Provide Internet services and computers to schools



Some Afghanistan “Take Aways”



- Understand the culture
 - Need to understand and be accepted
 - “Three Chai tea” rule
 - Perceptions of “Power” counts
 - Need to keep your word
- Manage expectations
 - Don’t over expect Afghans ability to perform
 - Lack of ICT skills and modern business skills and practices
 - Don’t raise expectations of Afghans if not sure of ability to deliver
- Good public-private sector partnerships key
 - Enable private sector
- ICT is important as both a sector and as an enabler—priority needs raised
- Collaboration and information sharing important—common shared situation awareness

Questions?

