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PROFILE OF THE INFORMATION SOCIETY IN THE

REPUBLIC OF IRAQ

2003

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INTRODUCTION

The Iraqi nation may at last have found the opportunity to realize its aspirations and play the leading regional role it was denied by virtually centuries of occupation, despotic rule and political strife. It is true, the sudden and violent change the US-led war brought this year onto Iraq is also breeding the all-too-familiar social and political turmoil – with added volatility and uncertainty about the future. It is becoming clearer day after day that political strife – and maybe armed resistance to American and British occupying forces – is increasingly undermining the establishment of a new Iraqi government that can smoothly administer the country's economic resources, especially in the short term.

The gestation period may well spill into the best part of 2004 before a reasonable level of normalcy is restored at the level of the citizen as well as that of public and private institutions. Nonetheless, noticeable progress will be felt with lifting of United Nations sanctions and the resumption of public services as well as operations in key government bodies, under United States supervision.

Following Iraq's invasion of Kuwait in August 1990, the United Nations' Security Council adopted resolution 661, imposing sanctions on Iraq (and occupied Kuwait), and established the 661 Committee to implement these sanctions. A series of additional resolutions followed, designed to define the terms of the withdrawal and disarmament of Iraqi forces and weapons of mass destruction. In April 1995, the Security Council adopted resolution 986, establishing the "Oil for Food" program.

Under the program, Iraq would be allowed to sell oil in order to purchase necessary humanitarian supplies. Intense negotiations on the program between the United Nations and the Government of Iraq gave fruition to a memorandum of understanding signed between the two sides in May 1996, which paved the way for the export of Iraq's first shipment of oil under the UN sanctions in December 1996. The first shipments of food arrived in Iraq in March 1997.

Under the terms of the "Oil for Food" program, Iraq would be able to import only those items necessary for humanitarian relief, mainly food and medicine. Any items deemed remotely aiding the development of Iraq's arsenal of conventional and non-conventional weapons were banned under the sanctions, including information and communication technology products. This stranglehold on ICT imports led to further deterioration of a sector, already underdeveloped by regional and global standards, and heavily damaged by over two decades of wars waged on different fronts. The sanction left Iraq practically over 12 years – or more – behind in technology adoption.

The current state of communications in Iraq has severely hampered the scope of research for this report. The lack of telephone and email contact with Iraq in the period that this study was conducted, limited the majority of the research to secondary data published on the Internet. However, some contact was reestablished lately, and Madar Research was able to obtain some primary material from Iraqi sources inside the country.

With the late introduction of the Internet in the country, well into the UN sanctions against Iraq, Iraqi sources online are practically non-existent, save for intermittent issues and articles published by the government-operated Iraqi press, and the occasional statements by relevant ministers and officials on the state of information and communications technology (ICT) in the country. Furthermore, most Iraqi sites went offline within a few days of the start of the US- British war on Iraq. For the most part, this research relied on data published by the United Nations, International Telecommunications Union (ITU), Madar Research Journal and other international bodies and organizations, as well as on coverage of Iraq's information society in the Arabic and English media.

I. GDP AND ICT SPENDING – SCENARIOS OF GROWTH 2002-2008

Oil revenues will, indeed, be the main engines of growth in Iraq for many years to come. Iraq is said to be currently producing around 700,000 barrels per day (bpd), which will probably be raised to between 1.2 million and 1.5 million by end 2003. Rehabilitation of Iraq's oil facilities is expected to push production to three million bpd in 2004 – close to its peak production of 3.5 million bpd in 1990. If a choice is made after that to open up the country's massive oil reserves for excavation and development by international companies, oil production capacity can go up to five or maybe six million bpd within few years, according to various estimates.

The resumption of oil exports to pre-UN sanctions quotas and anticipated inflow of aid and reconstruction funds, will allow the Iraqi economy to gather momentum in the final months of 2003. However, a big jump in growth can be expected to happen in 2004, as volumes of oil exports undergo significant increases. The upturn might even take a totally unprecedented scale if the US manages to stabilize the Iraqi domestic political scene rather quickly and bring law and order into the life of the average Iraqi citizen.

In this context, Gross National Product (GDP) growth in Iraq during 2004 might hit a level well above 20 percent, especially if oil prices maintained fairly high levels. It should be noted here that solid double-digit growth rates are not unusual for Iraq. According to the *International Financial Statistics* by the IMF, Iraq's GDP witnessed such growth rates on several occasions since 1970: 18.7% in 1973, 15.0% in 1975, 17.3% in 1977, 11.7 in 1979, 11.7% in 1980 and 19.4% in 1987.

There are numerous internal and external political and economic factors that can shape the performance of Iraq as it rejoins the global economy, following decades of running a closed or suppressed economy. In order to arrive at a better feel of what growth course the Iraqi economy is likely to take in coming years, it is useful to examine more than one growth scenario, starting from a reasonable benchmark. In the absence of a historic precedent for an open and stable Iraqi economy, Saudi Arabia, which shares many features with Iraq, can help in constructing the picture for the emerging post-Saddam economy.

Both economies are characterized – among other things – by heavy reliance on the hydrocarbon sector, though Saudis have been pumping more than two or three times as much crude into the market. The two countries also share comparable population sizes and high levels of resistance to foreign penetration.

In 1979, when Saddam Hussein took office as the president of Iraq, the country's GDP – estimated at 54 billion dollars then – constituted 48% of Saudi GDP. By 2002 – after more than 12 years of UN imposed sanction – the ratio of Iraqi GDP to Saudi GDP fell to a mere 16 percent.

After analyzing the Iraqi economy and its variables, while drawing on the Saudi economic growth model, Madar Research produced three growth scenarios for Iraq's economy during the period 2002-2008.

According to a low-growth scenario, if Saudi GDP grows at an annual average of three percent, in order for Iraqi GDP to arrive by 2008 at a level constituting 24 percent of Saudi GDP in that year, it should grow at an annual average of 10.11 percent.

Under a medium-growth scenario, Iraq's GDP needs to grow at an annual average rate of 17.81 percent in order to reach a level constituting 36 percent of Saudi GDP by 2008.

The high growth scenario concludes that an Iraqi GDP growth rate of 23.59 percent is required in order for the size of the Iraqi economy to arrive to a point comparable to where it was in 1979 relative to the Saudi economy. Conditions for this best-case scenario include that a stable and reasonably representative government is installed in Iraq, substantial inflow of foreign investment build up, and oil prices maintain levels largely above the $18-per-barrel mark. This scenario also requires that Iraq's oil production exceed its peak of 1990.

TABLE 1. IRAQI GDP VS. SAUDI GDP IN 1979 AND 2002

	1979 GDP (Billion, US$)	2002 GDP (Billion, US$)
Iraq	54	29.95
Saudi Arabia	111.6	186.24
Ratio of Iraqi GDP to Saudi GDP	48%	16%

Notes:

(a) The values of Iraqi GDP in 1979 and 2002 are based on various estimates of Iraq's GDP level and growth in different years, provided by acknowledged academic sources, international firms specializing in 'country risk analysis' as well as the International Monetary Fund and the US Energy Information Agency;

(b) Saudi GDP figures were obtained from official Saudi sources.

TABLE 2. LOW GROWTH SCENARIO FOR IRAQI GDP FROM 2002 TO 2008

	2002 GDP (Billion, US$)	2008 GDP (Billion, US$)	Compound Average Growth Rate (2002-2008)
Iraq	29.95	53.37	10.11%
Saudi Arabia	186.24	222.38	3.00%
Ratio	16%	24%	

TABLE 3. MEDIUM GROWTH SCENARIO FOR IRAQI GDP FROM 2002 TO 2008

	2002 GDP (Billion, US$)	2008 GDP (Billion, US$)	Compound Average Growth Rate (2002-2008)
Iraq	29.95	80.06	17.81%
Saudi Arabia	186.24	222.38	3.00%
Ratio	16%	36%	

TABLE 4. HIGH GROWTH SCENARIO FOR IRAQI GDP FROM 2002 TO 2008

	2002 GDP (Billion, US$)	2008 GDP (Billion, US$)	Compound Average Growth Rate (2002-2008)
Iraq	29.95	106.74	23.59%
Saudi Arabia	186.24	222.38	3.00%
Ratio	16%	48%	

Digital Planet 2002 Report states that information and communication technology (ICT) spending represented 7.6 percent of world GDP in 2001. According to available data on the Arab world, the overwhelming majority of Arab countries are well below the world average in terms of their ICT spending as percentage of GDP. Since Iraq's ICT infrastructure is still barely developed even by regional standards, Madar Research Group predicts that Iraq's ICT spending in relation to its GDP will have to slightly exceed world average over the next six years in order to allow construction and development of an appropriate ICT infrastructure.

Accordingly, Iraq is forecast to spend around eight percent of its GDP on ICT-related development projects between 2002 and 2008.

Table 5 illustrates predicted Iraqi annual ICT spending levels relating to each of the three different scenarios of GDP growth. As shown, Iraq will spend a total of $17.77 billion on ICT under the low growth scenario between 2003 and 2008. Under the medium and high growth scenario, spending will reach a total of $23.71 billion and $29.22 billion, respectively.

TABLE 5. IRAQI ICT SPENDING IN BILLION $ UNDER THREE ECONOMIC GROWTH SCENARIOS

ICT Spending According to	2003*	2004 f	2005 f	2006 f	2007 f	2008 f
Low GDP growth	?	2.90	3.20	3.52	3.88	4.27
Medium GDP growth	?	3.33	3.92	4.62	5.44	6.40
High GDP growth	?	3.66	4.52	5.59	6.91	8.54

Source: Madar Research Group.

* GDP estimates for 2003 can vary by a large margin due to uncertainties over how the economy of Iraq will be run following the change of regime. Regardless of how the economy will perform by the end of 2003, GDP estimates for the following years will be least impacted.

By 2008, Madar Research predicts that major Iraqi ICT-use indicators will be about 10 percent higher than the levels exhibited in mid-2003 by their counterparts in Saudi Arabia, except for Internet users, which will be around 75 percent higher in Iraq compared to Saudi Arabia's mid-2003 figure.

Coming out from more than two decades of suppression and isolation, and eager to be again part of the world, Iraqis, especially the young and educated are expected to strongly embrace the Internet as their window to the world and a relatively cheap communication channel with some four million Iraqis who meanwhile had migrated to the West and other countries. A highly respected community of scientists and academics in Iraq is also expected to establish links with its counterparts worldwide.

Table 6 illustrates the forecast values of four main ICT-use indicators in Iraq by 2008. The associated penetration levels are based on the assumption that Iraq's population will grow at an annual rate of 2.8 percent over the six years in question.

TABLE 6. FORECAST IRAQI ICT PERFORMANCE IN 2008

Indicator	2008 f
PC installed base	2 million
PC penetration	6.96%
Internet users	3.5 million
Internet penetration	12.18%
Mobile phone subscriptions	6.6 million
Mobile phone penetration	22.98%
Fixed line subscriptions	3.9 million
Fixed line penetration	13.58%

Source: Madar Research Group

Figure 1. ICT Forecast for Iraq (2002-2008)
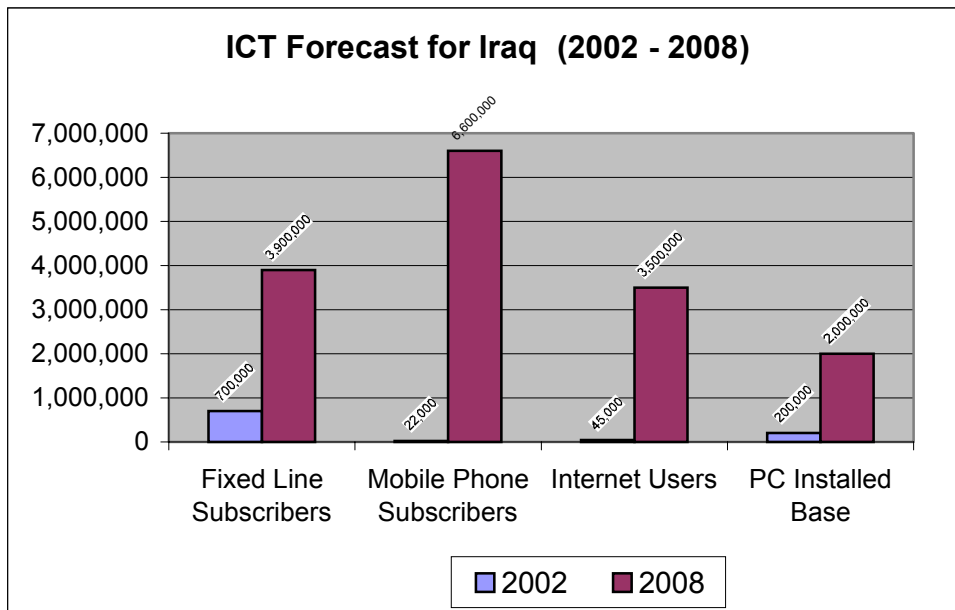
Source: Madar Research Group

II. POLICIES AND STRATEGIES

At a time when the rest of the region is introducing national ICT strategies and policies, hot on the heels of increased penetration of advanced telecommunications and information technology in both the private and public sector, Iraq lacks the most basic of technologies and infrastructure for such an endeavor – should the political will for the adoption of national information society policies and strategies have existed.

Prior to the 1991 Gulf War, Iraq boasted a highly advanced scientific culture and a long tradition of research and development in the field of science. But developments on the political scene and ensuing sanctions against the country led Iraq to focus on more pressing technological requirements, namely in the military and oil sectors. The introduction of ICT into the country was left to individual endeavors, with no government backing or funding. Necessity dictated what little ICT penetration that existed in the different sectors such as government and health.

The absence of government ICT planning and strategies, along with a very poor ICT infrastructure and adoption, have led to Iraq being ranked at the bottom of global statistical indices. The ITU e-Readiness Index for 2002 ranks Iraq among the bottom 15 nations worldwide in e-readiness, which it defines as the measure of a nation's current ICT development, as well as the measure of its economy's ability to make use of ICT in the future.[1] Iraq ranks 206 in a sample of 208 nations in the ITU survey, trailed only by North Korea and Guinea-Bissau.

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[1] ITU *Global ICT Index 2002* (http://www.itu.int/ITU-D/ict/papers/2002/SCM/TR.pdf)

TABLE 7. ICT e-READINESS INDEX BOTTOM 15

Country	Index	Rank	GDP
Guinea-Bissau	1.94	208	$519
North Korea	2.82	207	N/A
Iraq	2.85	206	N/A
Comoros	3.11	205	$1,379
Samoa	3.95	204	$4,067
Benin	4.02	203	$946
Djibouti	4.05	202	N/A
Myanmar	4.23	201	N/A
Chad	4.93	200	$859
Liberia	5.33	199	N/A
Tonga	5.78	198	N/A
Rwanda	5.87	197	$926
Gambia	5.97	196	$1,611
Swaziland	5.98	195	$3,942
Vanuatu	6.09	194	$3,078

Source: ITU.

III. LEGAL AND REGULATORY FRAMEWORKS

A. INTELLECTUAL PROPERTY RIGHTS

National trademark and copyright protection laws were legislated in Iraq in 1957 and 1971, respectively. Despite the early adoption of such laws, enforcement is another matter altogether, in a country rife with intellectual piracy, especially under UN sanctions and in current circumstances.

On the international level, Iraq has also signed a number of intellectual property rights treaties and agreements. These, however, have been suspended or frozen in the aftermath of the 1991 Gulf War and ensuing sanctions.

Most notably, Iraq is a member of the World Intellectual Property Organization (WIPO), which seeks to protect intellectual property rights in music, books, art, film, trademarks and patented inventions among others, as well as the protection of intellectal property rights in information technology and the Internet. Iraq is also a signatory (January 1976) to the Paris Convention for the Protection of Industrial Property, on which the WIPO was founded. However, it has yet to sign the joint World Trade Organization – World Intellectual Property Organization (WTO-WIPO) Agreement on Trade Related Aspects of Intellectual Property (TRIPS), which came into being in 1995, as well as the Patent Cooperation Treaty (PCT) and the Patent Law Treaty (PLT).

B. TELECOM REGULATORY FRAMEWORK

The Iraq Telecommunications and Post Company (ITPC), which reports to the Ministry of Transport and Communications, is responsible for the provision of telecommunications services in the country. In the absence of an independent telecommunications regulatory authority, the Ministry of Transport and Communications assumes that responsibility to some degree. The ministry was also the authority responsible for the award of Iraq's mobile-phone network contract in 1999.

The Ministry of Information, on the other hand, is responsible for the provision of Internet access, through the Internet Services Company, which in turn operates Iraq's two service providers, Uruklink and Warkaa. Internet use is subject to restrictions on "moral and ethical" grounds. Content that is politically sensitive is, needless to say, prohibited, although Iraq claims to only censor pornography and other morally unacceptable material. This, of course, is now changing, and – until a future government lays down a new policy regarding censorship and freedoms of expression and access to information – access to Internet content is expected to be largely unrestricted.

TABLE 8. IRAQ'S PARTICIPATION IN NATIONAL AND GLOBAL INTELLECTUAL PROPERTY ENTITIES AND TREATIES

Entity/Treaty	Signatory
National Trademark Law	Yes (1957)
National Copyright Protection Law	Yes (1971)
Paris Convention	Yes (1976)
World Intellectual Property Organization (WIPO)	Yes (1976)
Patent Cooperation Treaty (PCT)	No
Madrid Agreement	No
Hague Agreement	No
Trademarks Law Treaty (TLT)	No
Patent Law Treaty	No
Nairobi Treaty	No
Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)	No

C. LEGISLATION

In light of the country's underdeveloped ICT infrastructure and lack of resources, no laws and regulations have been legislated that deal with privacy and security issues in the ICT domain. The country's legal system has remained frozen in pre-war legislation – a time when there was little need to define laws and regulations concerning an ICT sector that was not yet developed even on the regional level. With the imposition of sanctions and ICT dissemination effectively throttled such laws seem premature.

IV. ICT INFRASTRUCTURE

Given what Iraq has been through, it is no surprise that it performs poorly in terms of ICT adoption. Iraq has ranked 17 among 18 Arab countries – outranking only Sudan – in Madar ICT Use Index, which serves as a comparative tool between Arab countries in terms of their adoption rate of basic ICT indicators (See Table 10). The index uses figures for PC installed base, Internet users, and fixed and mobile phone lines, to determine scores.

A. FIXED LINE INFRASTRUCTURE

The media often paints a picture of a flourishing telecommunications sector in Iraq prior to 1990, but according to International Telecommunications Union (ITU) statistics, telephone penetration in Iraq was lower than its neighbors, and on par – or slightly higher than – North African countries. In fact, in spite of Iraq's much higher GDP its telephone penetration was even lower than that of Syria, albeit marginally. In 1988, there were approximately 678,000 fixed-line subscribers, representing a penetration rate of 4.02 percent. By 1990, fixed-line subscribers numbered 712,000 at a penetration rate of 3.94 percent. With the start of the Gulf War, this penetration rate dropped to 3.62 percent in 1991. On the eve of the war, telephone penetration in neighboring Kuwait, on the other hand, was a high 20 percent.[2]

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[2] United Nations Statistics Division. (http://unstats.un.org/unsd/mi/mi.asp) - UN statistics include mobile phone subscribers too, but in the period 1988-1990, mobile phone subscribers, if found, were insignificant and did not affect penetration rates much).

TABLE 9. ARAB COUNTRIES RANKED BY MADAR ICT USE INDEX – END FEBRUARY 2003

Rank	Country	Population	PC Installed Base	Internet Users	Fixed Lines	Mobile Phones	ICT Use Index
1	United Arab Emirates	3,700,000	590,000	1,100,000	1,100,000	2,507,500	1.43
2	Bahrain	728,000	108,000	180,000	177,000	392,000	1.18
3	Kuwait	2,418,000	300,000	245,000	483,000	1,400,000	1.01
4	Qatar	805,000	108,000	75,000	178,000	280,000	0.8
5	Lebanon	4,387,000	275,000	505,000	760,000	840,000	0.54
6	Saudi Arabia	23,898,000	1,800,000	1,920,000	3,420,000	5,500,000	0.53
7	Jordan	5,332,000	233,000	342,000	805,000	1,240,000	0.49
8	Oman	2,760,000	97,000	165,000	234,500	484,500	0.36
9	Palestine	3,450,000	130,000	200,000	320,000	570,000	0.35
10	Morocco	31,430,000	510,000	600,000	1,250,000	6,436,000	0.28
11	Tunisia	10,000,000	328,000	524,000	1,163,000	700,000	0.27
12	Egypt	71,300,000	1,130,000	2,000,000	7,960,000	4,628,000	0.22
13	Syria	19,000,000	334,000	275,000	2,070,000	470,000	0.17
14	Libya	5,433,000	135,000	160,000	521,000	75,000	0.16
15	Algeria	32,549,000	310,000	610,000	1,904,000	595,000	0.11
16	Yemen	19,100,000	145,000	55,000	510,000	523,000	0.06
17	Iraq	24,340,000	200,000	45,000	700,000	22,000	0.04
18	Sudan	37,065,000	185,000	92,000	780,000	340,000	0.04
	Total	297,695,000	6,918,000	9,093,000	24,335,500	27,003,000	0.23

Source: Madar Research Journal

TABLE 10. IRAQI FIXED LINE SUBSCRIBERS AND PENETRATION 1998 – 2002

	1988	1990	1992	1994	1996	1998	2000	2001	2002*
Fixed Line Subscribers	677,809	712,109	714,389	649,207	639,699	649,963	675,000	675,000	700,000
Fixed Line Penetration	4.02%	3.94%	3.76%	3.30%	3.10%	2.98%	2.94%	2.86%	2.88%

Source: ITU (*2002 figures are Madar Research estimates)

In 1998, an ITU delegation to Iraq, on a mission to assess the country's telecommunication needs in order to facilitate the UN "Oil for Food" distribution program, gave a concrete insight into the dilapidated state of Iraq's telecommunications infrastructure. The ITU report stated that 81 of Iraq's 207 telephone exchanges were manual, 27 were of the mechanical crossbar type, and 100 exchanges were of the stored program controlled (SPC) digital type – one of the first models of digital exchanges manufactured in the early 1980s. Built mostly by the French telecommunications giant, Alcatel, between 1973 and 1986, all 207 exchanges had become obsolete by the late 1990s.

Heavy bombing of Iraq's telephone exchanges, microwave relay stations and cable networks during the 1991 Gulf War, meant to cripple or completely cut off communication to the country's ruling elite, led to further deterioration of the vital telecommunications sector. The telecommunications sector was one of the most severely damaged segments of Iraq's civilian economy. The ITU report stated that the bombing led to a destruction of about a third of Iraq's total exchange capacity of 770,000 lines (or approximately 206,000 lines). Baghdad's telecommunications infrastructure suffered the most, with eight of the city's 19 telephone exchanges destroyed.

At a toll of several hundred million Iraqi Dinars, the official Iraqi estimate of damages to the country's telecommunications infrastructure in the 1991 Gulf War included the total destruction of 14 exchanges (capacity 210,000 lines), partial destruction of 13 exchanges (capacity 140,000 lines), and total disruption of the two earth stations and the microwave network, both national and international. Iraq stated that the total damage to the telecommunications system was about 35 percent.[3]

Efforts to repair the damaged infrastructure were hampered by United Nations sanctions, which prohibited the import of any telecommunications equipment, which could be used by the Iraqi government to build weapons of mass destruction or strengthen the military apparatus. The Iraqi Ministry of Transport and Communications resorted to using equipment and parts from functioning exchanges to restore some functionality to the destroyed exchanges. This of course decreased capacity and call quality in undamaged exchanges.

ITU statistics indicate that by 1998, fixed line penetration had fallen to 2.98 percent – approximately 650,000 fixed line subscribers.

Figure 2. Fixed Line Penetration (1998-2002)
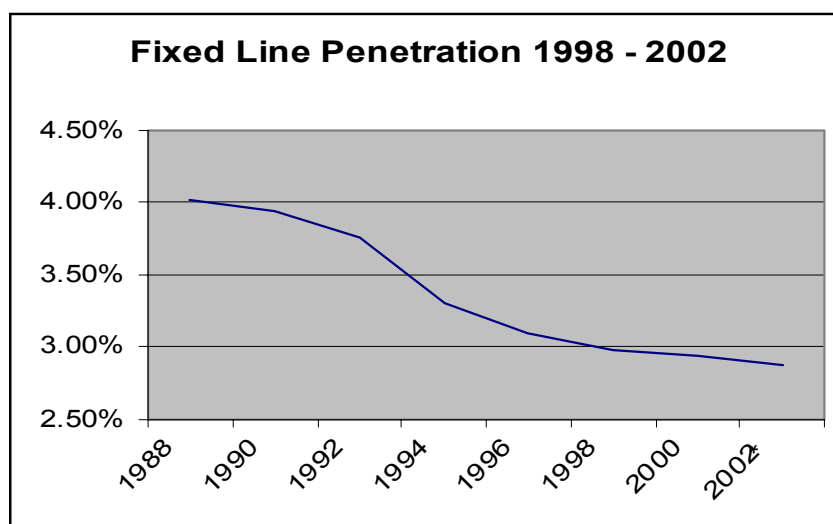
Source: Madar Research Group.

Upon the recommendation of the ITU team, which stated that poor telecommunications services (where, for example, acquiring dial tone could take anywhere from a few seconds to several days) were a hindrance to the operations of the UN's "Oil for Food" distribution program, the United Nations in May 1999 added the telecommunications sector to those sectors eligible for reconstruction under the distribution plan.

In the Distribution Plan submitted by the Iraqi Government to the UN Secretary General under Phase V, the Iraqis reiterated the findings of the ITU delegation to Iraq in 1998, and presented their requirements for the replacement of old exchanges, the installation of a small mobile phone network for the capital, Baghdad, and the introduction of a data network that would facilitate communication between the different parties involved in the "Oil for Food" program.

Once free to repair their telecommunications infrastructure, within the confines of UN resolutions restricting the import of technologies and equipment that could have "dual-use", Iraq contracted hundreds of millions of dollars in telecommunications contracts, mostly with French, Chinese, Russian, German and Turkish companies. Both Iraq and the companies were required to submit to a lengthy process of applications and approvals, culminating in the final approval by the United Nations 661 committee. Contracts that were suspected of dual-use purposes were forwarded to the UNMOVIC-IAEA joint committee for review.

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[3] Uruklink portal. (www.uruklink.net/iraqinfo/chall19.htm).

Under the Phase V to Phase XIII Distribution Plans of the "Oil for Food" program presented to the United Nations, Iraq submitted numerous requirements for the replacement of old exchanges as well as the installation of new ones, aimed at increasing capacity in Baghdad, as well as nationwide. These included, at various stages, the replacement of about 425,000 old fixed lines and the installation of about 400,000 new lines. It also submitted a request for the construction of an optical fiber link from Baghdad to Trebil on the Iraqi border, which would provide an international link with Jordan and the international submarine cable FLAG (Fiber-Optic Link Around the Globe). These requirements were scheduled for approval, but it is not clear whether they made it past the submission or contracting stage.

For both practical and political reasons, the greater part of telecommunications contracts went to Alcatel. The company had built most of the original infrastructure and was best equipped to repair and upgrade Iraq's antiquated telecommunications system. France was also being courted as an ally for Iraq on the United Nations' Security Council, and significant contracts granted to a French company were certainly to sway French support for Iraq.

Between 1999 and 2001, Alcatel signed a series of contracts for the repair of Iraq's fixed line infrastructure, although the precise specifications of the contracts and their values are not clear. These included a contract for the building of a new international exchange, with a capacity of 1,200 lines, as well as a microwave telephone network to link the capital with Iraq's central and southern provinces. Another contract involved the installation of new telephone exchanges with a total capacity of 280,000 lines.

A partial list of contracts, published by the United Nations' Office of the Iraq Program (OIP) in early 2001 and later removed from their website, detailed those contracts that had been blocked in Phases V to VIII, primarily by the US, on dual-use concerns. These included 11 contracts signed by Alcatel worth over $74 million. The 661 Committee later released some of these contracts, as well as others from the list.

TABLE 11. PARTIAL LIST OF TOP 20 TELECOMMUNICATIONS CONTRACTS
BLOCKED UNDER UN SANCTIONS (PHASES V – VIII)

Phase	Contract Received	Mission	Exporter	Goods	Amount ($)	Held by
V	Apr 1999	China	Huawei Technologies Co.	Telecom equipment	28,164,530.00	UK, USA
V	Mar 1999	France	Alcatel Cit	Telecom equipment	24,372,885.59	USA
V	Mar 1999	France	Alcatel Cit	Telecom equipment	17,406,039.30	USA
VII	Sep 2000	France	Alcatel Cit	Telecom equipment	13,060,838.16	UK, USA
V	Mar 1999	France	Alcatel Cit	Telecom equipment	12,791,318.47	USA
VII	Jul 2000	Russia	Joint Stock Company Pta	Fiber optic equipment	5,710,000.00	UK, USA
V	Sep 1999	Germany	Siemens Ag	Telecom equipment	5,605,115.07	USA
VI	Oct 1999	Malaysia	Riger Corporation	Telecom equipment	4,781,300.00	UK, USA
VII	Apr 2000	Turkey	Kayaoglu Dis Ticaret Ltd.	Telecom equipment	4,730,000.00	USA
VII	Sep 2000	Lebanon	Graphtel Sarl	Microwave radio link	4,116,000.00	USA
V	Jun 1999	Malaysia	Riger Corporation	Telecom equipment	3,450,700.00	UK, USA
VII	Jul 2000	China	Cmec Int'l. Eng'g Co. Ltd.	Digital microwave link	3,447,500.00	UK, USA
IV	Feb 1999	France	Alcatel Cit	Telecom equipment	2,735,949.30	USA
VIII	Jan 2000	India	Himachal Futuristic Communications	Microwave digital link	2,411,039.00	UK, USA
VII	Sep 2000	France	Sagem	Fiber optic cable	2,238,161.07	UK, USA
VII	Feb 2000	China	Catic	Cable	1,968,369.00	UK, USA
VII	Aug 2000	Norway	Nera Network Spain As	Digital microwave link	1,878,730.00	USA
VIII	Feb 2001	Jordan	Al-Baha Establishment	Microwave monitoring system	1,832,660.29	UK, USA
VII	May 2000	Turkey	Kayaoglu Dis Ticaret Ltd.	Communication system	1,760,000.00	UK, USA
VIII	Jan 2001	Turkey	Alcatel Teletas Telekomunikasyon	Telecom equipment	1,574,901.83	USA

Source: United Nations in www.ccmep.org.

In 2000, the Iraqi Telecommunications and Post Company opened several hundred public telephone centers, to serve the public, given the shortage of telephone lines to homes and businesses, and the dire need for telecommunications in a country cut off from the world. These centers were subsequently handed over to the public sector for operation.

Most coin-operated public phones, found in Baghdad and other major Iraqi cities in the 1980s, were destroyed during the 1991 Gulf War. What few remained, were gradually rendered useless with the depreciation of the country's currency and the disappearance of coins from use.

A new magnetic card operated system, supplied by Alcatel Teletas Telekomunikasyon (Alcatel Turkey) was installed in the last quarter of 2002 in Baghdad. Magnetic cards were priced at 5000 Iraqi dinars ($2.5) and 25,000 Iraqi dinars ($12.5). The card-operated telephone systems were put into operation late 2002, and were only functional for a month or two before the Iraqi Telecommunications and Post Company stopped the service, reportedly for reasons of security, before the start of the 2003 Gulf War.

Similar reports circulated about the fixed line network, with claims that Iraq, in late 2002, dismantled parts of the fixed line infrastructure to avoid their destruction in the case of war.

In an effort to overcome increased isolation and garner support from its neighbors, the Iraq Telecommunications and Post Company signed an agreement in September 2001 with its Syrian counterpart, the Syrian Telecommunications Establishment, to tie the Iraqi and Syrian telecommunications networks. Surplus capacity on Syria's international marine cable could be offered to Iraq, as well as other neighboring countries. Syria also offered to extend its mobile phone and Internet networks into Iraq, stating that its ICT infrastructure had already reached those Syrian villages on the Iraqi border. However, it is not clear if anything came out of the meetings between the Syrians and the Iraqis, as well as the agreements, in the telecommunications sector.

B. MOBILE PHONE NETWORK

Iraq is one of the last countries in the world to acquire a mobile phone network, at least officially. Unfettered by United Nations restrictions and sanctions, the Kurdish controlled towns of Sulaimaniya and Irbil in the north have a small commercial mobile phone network, operated independently of the Iraq Telecommunications and Post Company, by Kurdish entrepreneurs. The network is based on a prepaid card operated scheme, and includes such services as SMS. It serves about 22,000 mobile phone subscribers.

Iraq's central and southern provinces, however, have been unable to set up a mobile phone network until the present. In early 1999, after submitting its requirements under the Distribution Plan for Phase V of the "Oil for Food" program to the United Nations, Iraq signed a contract with Chinese Huawei Technologies Co. for the provision of a mobile phone network and equipment for Baghdad. The contract, worth over $28 million, involved the set up of a network of 60 base stations with a capacity for 25,000 mobile phone subscribers over a 50-kilometer radius. However, this contract was also soon blocked by the United States, amid accusations that the Chinese company was providing fiber optic connectivity to the Iraqi military.

In 2001, the United States pushed for the restructuring of United Nations sanctions against Iraq, and used the blocking of contracts as a tactical maneuver to pressure China and France to support the United States' Smart Sanctions proposal. In June 2001, China acquiesced and supported the American proposal. A month later, the United States unblocked Huawei Technologies' contract for the mobile phone network, as well as other Chinese contracts in the telecommunications sector, worth over $80 million in total.

France followed suit and demanded that the United States unblock French contracts as well. Accordingly, the United States released nine Alcatel contracts for microwave and digital radio links, as well as other telecommunications equipment, but continued to block a contract for fiber optic equipment worth $333,000.

However, in September 2001, when Huawei Technologies was scheduled to deliver the mobile phone network equipment, Iraq's Ministry of Transport and Communications announced the Chinese company had

pulled out of the contract. No reason was given for the pull out. A month later, Iraq announced that it had awarded the contract to another Chinese firm, China National Technology Import Company (CNTIC). Hassan Al-Mua'ini, Iraq's former minister of transport and communications, declared that the project would be completed in nine months, but did not say when the work on the project would begin. It is not clear how much of the work on the Iraq's mobile phone network was carried out, if at all, but to date, there is no operational mobile phone network in Baghdad.

Note should be made that during the various phases of the Oil-for-Food Program, Iraq submitted its requirements for the expansion of the already-approved Baghdad's mobile phone network – from 25,000 subscribers to 150,000 subscribers. Other projects included the expansion of the network outside Baghdad to cover 20 cities and townships in the central provinces of Iraq, with a capacity of 200,000 subscribers, and to cover three towns (Mosul, Tikrit and Samara) in the northern provinces with a total capacity of 40,000 subscribers. No contracts to date have been granted for the mobile phone expansion projects.

Repeated references in the press about a small mobile phone network that existed for high-ranking officials and aid workers in the country's capital, as well as an SMS text messaging campaign by the United States directed at the country's military personnel in early 2003, are implausible. Iraqi officials and foreign aid workers were more likely using satellite phones such as the Thuraya, which were later on used by journalists and aid workers during the 2003 war on Iraq. Long range cordless phones were also very popular among the elite and affluent residents of the Iraqi capital.

C. PRESENT TELECOMMUNICATIONS STATUS

On the eve of the 2003 Gulf War, Iraq's fixed-line network had witnessed significant improvement. The United Nations reported that 96,000 old telephone lines had been replaced and 29,000 new telephone lines added, bringing the number of fixed lines in the country by year-end 2002 up to about 700,000. Fixed line penetration registered a slight improvement, at 2.88 percent. This penetration rate still places Iraq among the bottom five Arab countries in fixed line penetration, ranking slightly ahead of Yemen and Sudan.

TABLE 12. BOTTOM 5 ARAB COUNTRIES IN FIXED LINE PENETRATION – END FEBRUARY 2003

Country	Fixed Lines	Fixed Line Penetration
Algeria	1,904,000	5.85%
Morocco	1,250,000	3.98%
Iraq	700,000	2.88%
Yemen	510,000	2.67%
Sudan	780,000	2.10%

Source: Madar Research Group.

However, in the aftermath of the March-April 2003 war on Iraq, further damage to the country's telecommunications infrastructure was sustained. Recently repaired exchanges in Baghdad were once again hit by coalition bombing, in another deliberate attempt to cut off communication among the country's ruling elite. Six of Baghdad's telephone exchanges were completely destroyed, while other exchanges sustained lesser damages. With the telephone switching centers destroyed, telephone calls could not be routed to other exchanges in the capital, and Iraqis could only make calls within their neighborhoods. However, there are claims that the majority of the telephone exchanges are intact, lacking only electricity.

Long before the United States and the United Kingdom launched their war against Iraq in March 2003, the United States had begun to plan for the reconstruction of Iraq's telecommunications sector, among others, in anticipation of the fall of Saddam Hussein's government in the war.

In June 2002, the US State Department formed the Future of Iraq Project, staffed by Iraqi exiles, which would guide the country towards reconstruction and reintegration with the global community. The project's Economy and Infrastructure Committee oversees the work of the Telecommunications Subcommittee, which has been involved in identifying the present status of Iraq's telecommunications

sector, and developing plans, in the immediate, short and long term, to upgrade and develop the sector. The Future of Iraq Project serves as the advisory committee to the United States administration, which in turn awards Iraq reconstruction contracts through the Department of Defense and United States Administration for International Development (USAID).

With the war on Iraq nearing its end in April 2003, news of telecommunications contracts in post-war Iraq began to circulate. Since the rehabilitation of the fixed line network is expected to entail considerable investment and time, the setup of a mobile phone network appeared the more practical and quicker option to address the immediate need for a communication system.

One of the first conflicts to arise was the early discussion of the technology to be used to build Iraq's mobile phone network. Rep. Darrel Issa, (Republican - California) proposed installing a network built on the Code Division Multiple Access (CDMA) standard developed by San Diego, California based Qualcomm Inc., as opposed to the European GSM standard.

Apart from the nationalist bent to Issa's argument for CDMA, there appeared to be an economical/political one. Issa represents the same southern California district where Qualcomm is headquartered, and the company has made a contribution, albeit small, to Issa's election campaign.

Issa's proposal was quickly shot down by the GSM association which claimed that the GSM standard should be implemented, not for nationalist reasons nor as a result of American political clout, but because the technology is used by Iraq's neighbors, and for that matter, the whole region, including Europe, Africa and large parts of Asia. A CDMA network would isolate Iraq and make services, such as roaming, difficult outside of its borders.

Furthermore, American companies such as Motorola have long been involved in the setup of GSM networks in the region, and stood to benefit in the event that a GSM system was approved for Iraq's mobile phone network.

Prospective telecommunications providers turned to the United States Department of Defense and USAID for telecommunications bids and tenders, but these were not forthcoming. USAID, in early May 2003, announced it would not be awarding any contracts for Iraq's telecommunications sector. The agency added that the matter would be left to the next Iraqi government, when it was formed, to mandate standards for Iraq's telecommunications infrastructure and to decide to whom the contracts would be awarded. The logic appears – at least partly – to be that funding Iraq's telecommunications infrastructure is not necessary, when so much commercial interest in the sector has surfaced.

The US Department of Defense, however, granted a number of telecommunications and data networking contracts, some even before the war had ended. The department faced criticism that contracts were being awarded in secrecy, without an open bidding process, when it granted American telecommunications provider, MCI (formerly WorldCom) a contract for the supply and deployment of a small GSM network in Baghdad. The mobile phone network is intended to provide support to international aid workers, Iraqi government officials and US military personnel in Iraq. The contract, set for completion in June 2003, will initially provide service to about 5,000 to 10,000 people in the capital, over a network of 19 cell towers.

MCI is reported to have tapped Swedish telecommunications provider, Ericsson, for the supply of the GSM equipment for the project in Iraq. Ericsson, often a subcontractor for MCI, has however declined to confirm the report.[4]

The contract value of the MCI deal has not been disclosed, but it is part of a broader $45 million telecommunications project that includes a $10 to $25 million deal with US telecommunications provider, Motorola, to establish radio communications for the US military in Baghdad for the short-term. In early June

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[4] EuropeMedia.net (http://www.europemedia.net/shownews.asp?ArticleID=16471).

2003, Motorola was also awarded an additional four-month contract, worth $15.8 million, to supply the Baghdad Police Force with 3,000 mobile radios and base stations.

The US Department of Defense is expected to eventually turn the MCI network over to the incoming Iraqi government, which will then license it to network providers. Several network providers have expressed interest in the Iraqi mobile phone market, including Kuwaiti MTC-Vodafone and Egyptian Orascom Telecom.

Early on in the war, MTC-Vodafone had set up reception booster stations along the Iraq-Kuwait border, and was set to move into the Iraqi market as soon as the war ended. In early May, the British forces in Basra requested MTC-Vodafone set up two mobile booster stations in the city to facilitate communications between the troops and also to provide limited telecommunications services to Basra residents. SIM cards and mobile phones were sold for $500 a set.

In late May, MTC-Vodafone signed another contract with the US Central Command in Qatar for a six-month mobile phone network operating license covering the area between the Kuwaiti border and Baghdad. MTC announced that mobile phone services would be sold either from Kuwait or through the company's authorized distributors in Iraq.

Both contracts, awarded by the US and British military, are meant to fill the immediate void in telecommunications in the country. Larger contracts for the set up of a nationwide network have yet to be awarded, but by 2008, Madar Research estimates that fixed line subscribers will reach 3.9 million by 2008, while mobile phone subscribers will number 6.6 million.

TABLE 13. TELEPHONE INDICATORS

	2002	2008 f
Fixed Line Subscribers	700,000	3,900,000
Fixed Line Penetration	2.88%	13.58%
Mobile Phone Subscribers	22,000	6,600,000
Mobile Phone Penetration	0.09%	22.98%

Source: Madar Research Group.

Slated for Iraq's long-term plans for the setup of a mobile phone network are international telecommunications giants, Nokia, Motorola, and Ericsson, which have released statements indicating their interest in future telecommunication projects in Iraq. U.S.-based interWAVE, which makes wireless products for telecommunications equipment providers, has set up a sales, network engineering and customer support office in Baghdad in a bid to secure contracts for cellular wireless networks and solutions.

Alcatel, which received contracts worth $85 million for the reconstruction of Iraq's telecommunications infrastructure under the Oil-for-Food program, said that it would also be seeking telecommunication contracts in post-war Iraq, according to company statements. However, unsure of how events in the post-war period would play out, the company stated that its Middle East operations accounted for only four percent of the company's sales, and Iraq a fraction of that.[5]

On May 21, 2003, Agence France Presse (AFP) reported that telephone lines between east and west Baghdad were to be restored within a week, while the capital would be linked to other Iraqi cities within the next 28 days, according to officials from the Office of the Reconstruction and Humanitarian Assistance (ORHA), the US agency responsible for the reconstruction of Iraq.[6]

[5] Middle East accounts for less than four percent of Alcatel sales, May 1, 2003. Menareport.com.

[6] *Baghdad telephone lines to be restored within week*, May 21, 2003. AFP.

The ORHA source, who spoke on condition of anonymity, did not mention the party that would be carrying out the repairs to the fixed line network, although he did state that Iraqi technicians would be carrying out the greater part of the repairs. Given the complexity involved in upgrading Iraq's existing telecommunications infrastructure, built by Alcatel, with switching technologies by other companies, it seems likely that either Alcatel equipment or expertise are involved in the repair work. In light of the lifting of sanctions against Iraq, and French support for the US drafted resolution, Alcatel's involvement could be a sign of the release of French contracts signed with the outgoing Iraqi regime.

With the regime change in Iraq and the lifting of United Nations sanctions, old contracts with the previous regime will most likely come up for reconsideration, with American companies, formerly excluded from Iraqi projects, now in a strong position to pick up lucrative contracts in the telecommunications sector.

Iraq's contract, signed in 2001, with China National Technology Import Company (CNTIC) for the setup of a mobile phone network in Baghdad, is one such contract that will come up for review, as will most telecommunications contracts signed with Russian, German, Turkish and French companies, among others. The legal framework for the approval of these contracts is dependant on the establishment of an Iraqi government, and in turn a competent Ministry of Telecommunications, which will decide which contracts will be respected, as well as the establishment of an independent regulatory authority.

Figure 3. Fixed Line and Mobile Phone Penetration Rates
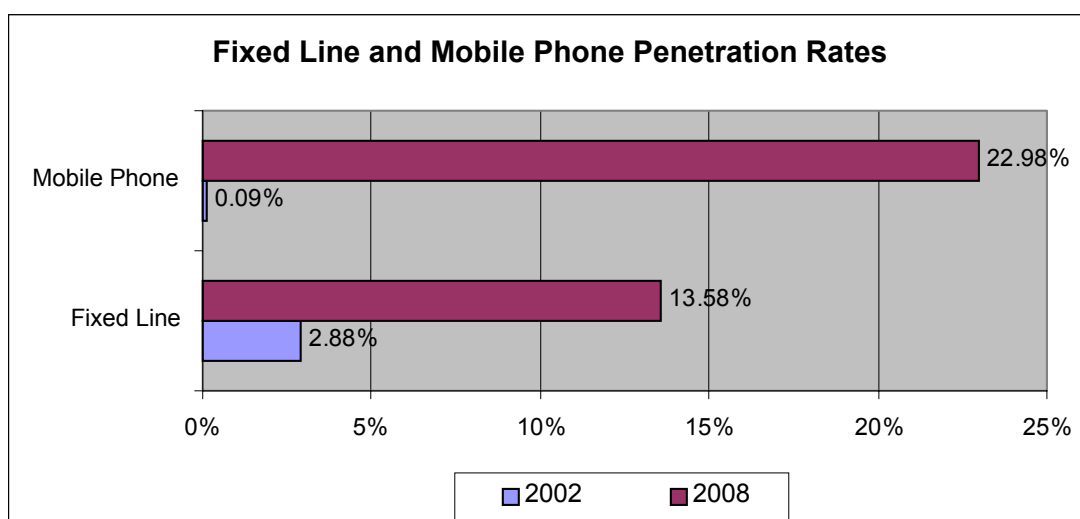
Source: Madar Research Group.

Unlike the setup of temporary or emergency telecommunications systems – as in the case of the MCI mobile phone network and the repair of the fixed line infrastructure in the country's capital – the development of Iraq's telecommunications infrastructure, currently in shambles, requires extensive planning and study. This becomes especially relevant in light of the opportunity to move straight into cutting edge technologies in Iraq, instead of overhauling an already outdated and largely obsolete infrastructure. The establishment of a competent and forward-looking Ministry of Telecommunications, as well as competitive telecommunications players, becomes of utmost priority.

D. SATELLITE TELECOMMUNICATIONS

During the March-April 2003 war on Iraq, satellite phones were virtually the only means of communication with the outside world. While Iraqis were prohibited from owning or using satellite phones by the government, correspondents and reporters, as well as aid workers relied heavily on them. United Arab Emirates-based Thuraya Satellite Telecommunications Company made far-reaching inroads in the Iraqi market, with its satellite phones in great demand throughout the war, and increasingly so since the end of the war. Thuraya has signed distribution deals with five global service providers for its satellite phones in Iraq.

The company estimates that about 10,000 handsets (priced at $600) have been sold in the country by early May, and the number is expected to rise to about 80,000 handsets by end 2003.

However, the expensive handsets and the high cost of calls place the Thuraya satellite phones out of the range of most Iraqis. The company is planning to introduce Public Call Offices (PCOs) in Iraq, in association with Greek telecommunications provider, Intracom, similar to public payphones. The PCOs, involving a cash register connected to a satellite phone, will provide a much cheaper communications system.

Other satellite phone providers in Iraq include US-based Iridium and UK-based Inmarsat.

E. THE INTERNET IN IRAQ

Iraq was the last Arab country to introduce the Internet to its public, in July 2000. Key government offices had Internet access a year earlier, but even high-ranking officials could send emails only through a central email clearing office, for monitoring and censorship.

The Ministry of Culture and Information is responsible for the provision of Internet access in the country, through the Internet Services Company, and in turn through two government-controlled service providers, Uruklink and Warkaa. When it was first introduced, the Internet was available only through Internet cafés or access centers. The first access center was officially opened in July 27, 2000, with 18 computers available to users – five computers dedicated for email access and 13 for Internet browsing. The center charged 2000 Iraqi dinars (USD$1) per hour of Internet use, as well as a charge for each email sent and received.

Internet access, however, was subject to heavy censorship, with sites blocked for indecent and "sensitive" content. Users claimed there were more sites blocked than available for browsing, with the all too familiar "Access Denied" message frequently popping up on computer screens. Web based email was prohibited, as were free personal homepage sites and domain registration sites. Users were also not allowed to download material from the Internet. Government employees monitored clients' Internet use rigorously, and were required to report any violation of the censorship rules. Any laxity on the part of these government monitors would be heavily punished.

Several Internet access centers soon opened up in the capital and the provinces, and by February 2002, the Iraqi state run TV reported the opening up of the country's 22nd Internet center.[7] To cope with the heavy traffic at Internet access centers, users could only book for an hour at a time, and would have to go to the back of the queue on a waiting list to get additional hours of Internet use.

Costly access and insufficient Internet cafés were further exacerbated by poor bandwidth. Iraq's entire Internet bandwidth was less than 10 megabits per second, the lowest of any Arab country[8] Modems were achieving between 14.4 kbps and 28.8 kbps when the Internet was first introduced, but only managed to rise to 33.6 kbps at most in recent times.

In September 2000, the Iraqi weekly, al-Iqtisadi, reported that private establishments, trade unions and foreign embassies could subscribe to private Internet access in Iraq. Foreign establishments and agencies were charged annual subscriptions between $3,000 and $12,000, while Iraqi businesses and private enterprises were charged between $2,500 and $8,000, according to tariffs placed by the Ministry of Transport and Communications.[9]

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[7] Xinhua News Agency, Feb 28, 2003.

[8] Telegeography quoted in USA Today, May 23, 2003. (http://www.usatoday.com/tech/world/2003-05-23-baghdad-online_x.htm).

[9] Iraq to charge foreigners $12,000 for Internet access, September 18, 2000. Menareport..

Shortly afterwards, in an apparent amendment to the annual subscription charges, Minister of Transport and Communications, Ahmad Murtada, announced that private companies, universities, trade unions and other establishments would be offered two subscription schemes. The first was wireless Internet access at an annual subscription fee of 7 million Iraqi dinars ($3,500) and the second, dial-up access at 2 million Iraqi dinars ($1,000).[10]

Internet access to the public remained available only through Internet access centers until August 2002, when the government permitted home access. Internet use for private individuals from home cost about $250 for an annual subscription, which was beyond the means of regular consumers. However, for those who could afford it, the service was a relief from the queues at Internet cafés and a convenient means of communication with relatives and friends abroad, without the watchful eyes of government monitors peering at every website users visited. However, Internet filters remained in place for home users too.

Home access was also available through another low subscription rate scheme available for university students and staff for about $25 annually. Users under this scheme could access the Internet only between midnight and 6 a.m. University students could also access the Internet for a nominal fee of 500 Iraqi Dinars ($0.25) an hour at Baghdad University's library, where a small computer lab was set up, consisting of eight computers.

Though the United States prohibits American companies from operating or doing business with Iraq, some firms have apparently been doing business with Iraq, either knowingly or unknowingly through agents in third countries. Although the Internet filter placed on the Internet gateway in Iraq is said to have been supplied by a French company, the "access denied" messages that appear when users visit prohibited sites, contain a reference to 8e6, an American company. The company has denied selling Iraq its content filtering software.[11]

Moreover, analysis of network records and routing patterns shows that Iraq's service provider, Internet Services Company, appears to send and receive nearly all its traffic through satellite hookups provided by the American satellite ISP, Atlanta International Teleport (AIT) and British satellite ISP, Satellite Media Services (SMS). Whenever Iraqis send an email or browse the Internet, their bits leave Iraq via the Internet Services Company's satellite modems, bounce off orbiting satellites and touch down again in satellite dishes run by AIT and SMS, which connect them to the Internet backbone in the United States and England, respectively.[12]

Meanwhile, Mentat, an American company, manufactured the satellite gateway used by the service provider, Warkaa. Mentat claims that it did not sell the SkyX gateway to the Iraqi government, but said they shipped one of the systems to a company in Dubai, in the United Arab Emirates, at the request of Mentat's customer, Atlanta International Teleport.[13]

Among items requested by the Iraqi government in the various phases of the Oil-for-Food Distribution Plan, for its Internet Services Company, were Cisco switches and routers, as well as routed WAN management suites. In Phase VIII, Iraq requested Unix and Windows NT operating systems, while in Phase XII, it requested 1,000 external US Robotics modems, as well as eight Sun servers, among other requirements. Clearly, American products were finding their way into the Iraqi market, even through official imports.

By end 2002, there were about 45,000 Internet users in Iraq, the majority of which were accessing the Internet through 50 to 60 Internet cafés nationwide. Internet users are defined as those individuals who have

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[10] AFT on October 5, 2000.

[11] *U.S. Tries E-Mail to Charm Iraqis,* Feb. 13, 2003 (http://www.wired.com/news/conflict/0,2100,57648,00.html).

[12] *Unleashing the Dogs of Cyber-War on Iraq* March 6, 2003 (http://www.salon.com/tech/feature/2003/03/06/iraq_geeks/print.html).

[13] *Iraq Goes Offline,* March 31, 2003 (www.salon.com/tech/feature/2003/03/31/iraq_offline/print.html).

accessed the Internet at least once in the 'past 30 days'. The figure for Internet users does not include those Internet users in the Kurdish controlled northern regions.

In late 2002, private Internet cafés were granted permission to operate, but these could only buy bandwidth through the Internet Services Company, and therefore provided the same slow and frustrating connections as the state owned cafés.

Figure 4. Internet Users (2002-2008)
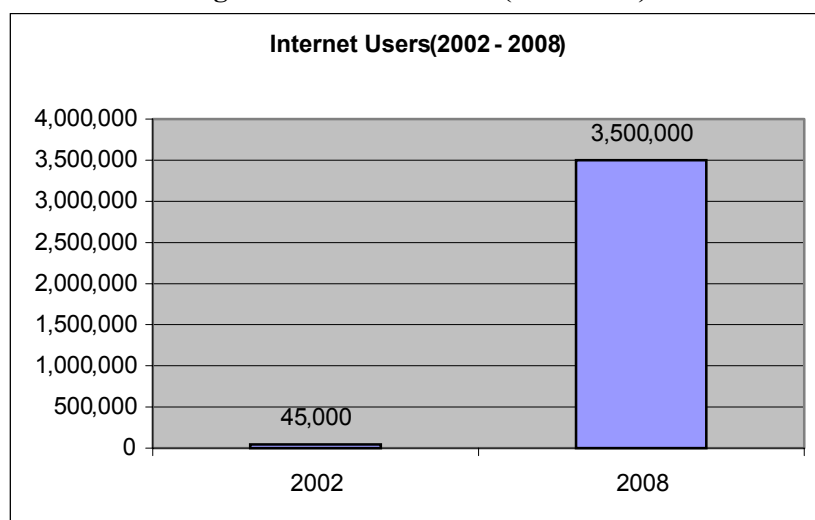
Source: Madar Research Group.

Penetration was the lowest in the Arab world, at 0.18 percent. Conflicting official Iraqi statements included estimates of Internet users at 250,000, which seem unlikely when one considers that Internet cafés had about eight to ten computers each, on average, and that poor fixed line infrastructure quality and availability, as well as expensive connections charges, could not have been conducive to widespread Internet home use.

TABLE 14. INTERNET USE INDICATORS

	2002	2008 f
Internet Users	45,000	3,500,000
Internet Use Penetration	0.18%	12.18%

Source: Madar Research Group.

The Iraqi presence on the Internet is limited mainly to the portal www.uruklink.net. Most other Iraqi websites are hosted as internal pages on the uruklink domain address, and are more like sections of the main portal. These include the websites or pages of the Ministry of Planning, Ministry of Oil, Baghdad Stock Exchange, Iraqi Tourism Board, various daily newspapers and monthly journals, and universities, among others.

Most of the websites hosted on Uruklink are primitive and bulky, comparable to the design and quality of amateur personal homepages. At most they serve as strictly informational portals. Pages remain under construction for months and years on end, while search engines return no results, if and when they finally function. Daily, weekly and monthly newspapers and journals are published online intermittently, sometimes updated daily, while at other times left untouched for several days or weeks before they are updated.

Meanwhile, Iraq does not hold the rights to its country code Top Level Domain (ccTLD), dot-iq, which was delegated in 1997 to US based InfoCom, a company that is currently facing federal prosecution for its alleged ties with Palestinian terrorist groups. There are currently no active dot-iq domains.

The Internet Corporation for Assigned Names and Numbers (ICANN) has been approached recently by the Committee for Information Technology Reconstruction in Iraq (CITRI), a UK based non-profit organization, to reassign management of the domain name to them, even if temporarily until it could be assigned to a relevant authority in Iraq, such as Baghdad University. CITRI has proposed to auction off the country's domain name to raise money for the reconstruction of Iraq's ICT infrastructure. However, to date there have been no changes to the dot-iq domain registrar.

For the first week or so of the March-April 2003 war on Iraq, Internet access remained available to Iraqi users, but coalition bombing soon destroyed the servers and satellite dishes at the Ministry of Information, as well as telephone switching centers, which rendered Internet access through dial-up modems impossible.

With the end of the war and the dire need for communication, several Iraqi entrepreneurs set up different connection schemes to fill the void, and capitalize on a new market opportunity.

Among the first such ventures was a five seat Internet café in Baghdad, providing access through an Inmarsat BGan satellite modem. Users browse an unfettered Internet at a hefty $5, while emails received and sent are charged an additional fee. Another private Internet café connects its six computers via satellite dish to a British satellite service provider, with users paying about $2 per hour to surf the Internet.

Meanwhile a group of 30 former Internet Services Company employees salvaged equipment from the Internet service provider, and set up a 50 seat Internet café at the state owned Internet center. The company had already paid in advance for one year of satellite Internet bandwidth. Users pay $1 per hour of use. Staff at this Internet center said they managed to set up their venture despite resistance from officials at the Ministry of Transport and Communications, who remain in place after the war.[14]

Private ventures such as these are expected to thrive in Baghdad and the provinces, in the short term, until the sector is regulated with the formation of an Iraqi government. The regulation of the Internet will not, however, be a priority concern of any incoming government, and entrepreneurs will be allowed to reign free of restrictions for a while. Most private Internet cafés popping up around Baghdad already offer clients uncensored access to the Internet, with no filters in place. Owners have said this will remain the case until the government defines regulations in this concern. However, users at the former Internet Services Company Internet access center still find some sites inaccessible, namely pornography sites.

The Kurdish controlled regions in the north, which have long adopted a free market economy approach, have had high-speed Internet access for several years. In August 2001, the northern city of Sulaimaniya had more than 20 satellite-linked centers for telephone, fax and Internet access, while the three universities in these Kurdish controlled areas provide Internet access to students through similar satellite links.

With Iraq undertaking to upgrade and rehabilitate its telecommunications and data networks, WiFi equipment manufacturers, such as US-based Cisco Systems, are promoting WiFi – a high frequency wireless local area network (WLAN) – as an alternative to wired LANs in Iraq. This move into high-speed broadband connections over a wireless network would allow Iraq to pass over traditional phone and cable networks altogether for voice and data communication.

F. PC DISSEMINATION

Under the terms of United Nations sanctions, Iraq was unable to officially import any computers with more than minimal processing power. This measure was meant to prevent Iraq from using high-powered computers to develop its military capabilities. Officially, Iraq was prohibited from importing any computer that exceeded a speed of 12.5 million theoretical operations per second (MTOPS) – a processing power equivalent to an Intel 486 processor.[15]

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[14] Iraq: Baghdad Opens First Internet Centre, 30 May 2003 (http://www.rferlorg/ncafe/features/2003/5/30052003134652.asp).

[15] *Mix of Uses Tangles Sanctions*, March 25, 2001 (www.washingtonpost.com/wp-dyn/articles/A56347-2001Mar25.html).

Mainframe computers were in use at the larger universities as well as in the oil industry sector and some government establishments, until the mid-1990s, with very limited PC penetration in the public and private sectors.

By mid-1990s, government establishments began to circumvent the UN sanctions by placing small to medium sized orders for computers through private sector companies. These, in turn, imported the equipment via an active black market through Jordan, Syria and the United Arab Emirates. Orders ranged between two and 150 computers at a time.

Through the same channels, the Iraqi Ministry of Commerce signed a number of large contracts, mainly with Iraqi-owned Syrian and Russian companies for computers and peripherals for the government sector. Contracts involving tens of thousands of computers, scanners, printers and other equipment were delivered. The Ministry of Commerce, in turn, sold the computers and equipment to other government bodies, including the Ministries of Health, Oil and Irrigation. Similarly, the Ministry of Higher Education and Scientific Research signed two large contracts for 22,000 and 30,000 computers destined for universities and higher institutes.

Following the signing of the Memorandum of Understanding between the United Nations and Iraq in May 1996, Iraq was allowed to import computers, but contracts were subject to great scrutiny for dual-use concerns. The 611 Committee had the final say in what goes into Iraq, and it blocked a number of PC orders on various grounds.

Among the larger orders Iraq placed for computer equipment under the Oil-for-Food Distribution Plan, was one for 10,000 computers in Phase XIII. The order, destined for the state owned Internet Services Company, included 200 laptop computers, 10,000 Canon and Minolta printers and thousands of other peripherals such as DVD drives, digital cameras and modems.

TABLE 15. PC USE INDICATORS

	2002	2008 f
PC Installed Base	200,000	2,000,000
PC Penetration Rate	0.82%	6.96%

Source: Madar Research Group

By end-2002, PC penetration in Iraq was estimated at 0.82 percent – a penetration rate only higher than that of Yemen and Sudan in the Arab world. This translated into an installed PC base of about 200,000 computers nationwide, excluding the Kurdish territories.

The scarcity of computers in the Iraqi market and the drastic shrinking of consumers' purchasing power have made PCs a precious commodity that was put to use much beyond its average life, leading to a high ratio of almost obsolete PCs in the installed PC base.

IV. ICT CAPACITY BUILDING

A. AWARENESS AND DISSEMINATION

Iraq lacks a national ICT awareness program, although there have been a few timid measures by the government to introduce ICT to some sectors, namely education, in recent years. *The Development of Education National Report of Iraq*, published by the Iraqi Ministry of Education in 2001 alludes to the importance of information and communication technology in the educational sector, and the necessity of introducing computers and related equipment to schools, universities and educational institutes. The report, however, states that United Nations sanctions against Iraq have prevented the development of this all-important sector in that Iraq has had to pay attention to more immediate concerns than ICT in education.

B. COMPUTERS IN SCHOOLS

Prior to 1990, Iraq's public spending on the educational sector amounted to 5.1 percent of its GDP, but currently is much less than that. The United Nations Educational, Scientific and Cultural Organization (UNESCO) stated that in the pre-war period, Iraq's educational system was one of the best in the region with

over 100 percent gross enrollment rate for primary schooling, as well as high levels of literacy among both men and women.[16] By the late 1990s, with a rising adult illiteracy rate (60.7 percent – up from almost completely eradicating illiteracy in the early 1980s), among the highest in the Arab world, the Iraqi educational sector was fast deteriorating amid the lack of basic educational necessities such as textbooks, stationary, school desks and even school buildings.

In an indication of the poor state of the educational sector, Phase X of the "Oil for Food" Distribution Plan, Iraq requested two million desks with seating capacity for four million students to eliminate the number of students sitting on the ground in classrooms.

There is very little published in recent years on technology and the educational system in Iraq, but in the face of such scarcity of basic requirements, widespread dissemination of computers in schools seems highly unlikely.

However, in February 2003, Babil Online, a semi-official newspaper, stated that the Ministry of Education had embarked on a program to distribute computers to schools nationwide, in order to disseminate ICT awareness among school children. The program also included training for all teachers that would be in charge of ICT instruction in schools. The plan was to include all secondary and vocational schools in the current and coming year. According to Babil Online, 500 primary and secondary schools would offer ICT instruction under the program.

In the same Distribution Plan above, Iraq requested 2,000 personal computers with peripherals such as printers and scanners, etc, as well as 500 disassembled computers meant to train students on computer maintenance. This indicates that there was at least some form of vocational training in computer studies in some schools or the intent to introduce ICT instruction, as per official statements.

In late 2001, Al-Quds School for Computers was formed, as a kind of technical/vocational high school for computer science studies. Graduates of the school were destined for the government sector, in various IT capacities and jobs, but with only one academic year fully completed before the outbreak of the March-April 2003 war, the school has not had the opportunity to achieve much. The school has a website on the uruklink.net portal, but as is the case with all uruklink pages, the site is down – at least by the time this report was completed.[17]

However, considering Iraq has over 12,500 primary, secondary and vocational schools, and about 4.75 million students, PC penetration in the educational sector appears to be very small, despite the increased interest in ICT development in recent years.

C. UNIVERSITY EDUCATION

Iraq's higher education establishments consist of 22 universities, colleges and technical institutes. Of these, about eight to ten have computer science or computer engineering faculties or departments, or sometimes both in the case of the University of Technology. These departments graduate about 2500-3000 students annually. The ICT curricula ware mostly outdated, with minor updates to textbooks that date back to the 1980s. University libraries are short on reference material and scientific and technological journals, and students resort to the black market, as well as the occasional book fair or exhibition, for relatively recent publications and textbooks on ICT. When found, these were mostly translations of English-language books and references, published by Arab publishing houses. Further exacerbating the deterioration of the educational system was the mass emigration of university professors and lecturers out of Iraq, in search of better economic prospects and opportunities.

In early 2000, the Iraqi president ordered that a university be set up to deal exclusively with computer technology, so that Iraqis would be kept abreast of the latest advances in the field of ICT.[18] In March 2000, the Iraqi Ministry of Education submitted a formal request to the Egyptian Ministry of Higher Education to

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[16] *UNESCO and Education in Iraq Fact Sheet,* March 28, 2003, (http://portal.unesco.org).

[17] www.urulink.net/qsc.

[18] First Internet Café Licensed in Iraq, August 2, 2000, Menaport.com.

begin a study for the establishment of a university dedicated to ICT studies, to compensate for Baghdad's lag in this field due to United Nations sanctions.[19]

Iraq appears to have invested more heavily in ICT in higher education, as evidenced by its requirements in the Distribution Plan in Phase X of the "Oil for Food" program. Iraq's order included 10,000 personal computers and 7,000 laser and dot matrix printers, as well as 1,000 laptop computers (with 500 specified as Toshiba and Sanyo), for use in the country's institutes of higher education. The requirements also included orders ranging between 30 and 1,000 computers for faculties of medicine, agriculture, mechanical and electrical engineering, geology and petroleum studies, in addition to related software.

D. RESEARCH AND DEVELOPMENT

In 1996, Iraq spent a negligible 0.04 percent of its GDP on research and development, according to a United Nations Educational, Scientific and Cultural Organization (UNESCO) report. The expenditure was the lowest in the Arab world, save for the United Arab Emirates, and had not risen over its 1992 level.[20] About 52 percent of researchers in Iraq are in the agricultural sector, while there is also a long tradition of research in the sciences, mainly in chemistry, biology and physics. The Iraqi Ministry of Higher Education and Scientific Research supervises all research and development works in the country.

There is no indication that Iraq spends any of its research and development budget on ICT related projects. It is also unlikely that Iraq was able to procure advanced IT equipment necessary for research, under strict United Nations sanctions, apart from possible clandestine research and development work in the military establishment.

VI. BUILDING THE ICT SECTOR

A. ICT FIRMS

Private sector ICT firms in Iraq fall under the small sized category, with most firms involved in supply contracts for computer equipment and peripherals, as well as service and maintenance contracts. Minor software and solutions development has been taking place in the country, but with high software piracy rates – at close to 100 percent – programmers and developers are unable to protect their work. Iraq appears to have imported some software from Egypt, as evidenced by contract disputes, which arose following the March-April 2003 war. With most businesses involved in traditional trade practices, computer equipment, and customized or read-made software and solutions, were not a high priority.

Private ICT firms opened shop with no restrictions. Most goods were imported from Southeast Asia through Jordan, but with the establishment of the Jebel Ali Free Zone, in the United Arab Emirates, most equipment began to flow to Iraq from the Emirates.

The public ICT sector is practically non-existent in light of the UN sanctions, which prohibited the import of high-tech equipment or the developing of such an industry. The government did manage, however, to organize a number of IT exhibitions and fairs, in association with Syria and Egypt in 2000 – 2001.

However, Iraq's relatively small ICT market, estimated at $200 million in 2002, is expected to rise to $6.4 billion in 2008, under a medium growth scenario, as outlined earlier in the report.

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[19] *A draft for establishing Iraqi university for technology sciences*, March 18, 2000, Arabic News (www.arabicnews.com/ansub/Daily/Day/000318/2000031821.html).

[20] *A draft for establishing Iraqi university for technology sciences*, March 18, 2000, Arabic News (www.arabicnews.com/ansub/Daily/Day/000318/2000031821.html).

Figure 5. Iraq ICT Spending (2002-2008)
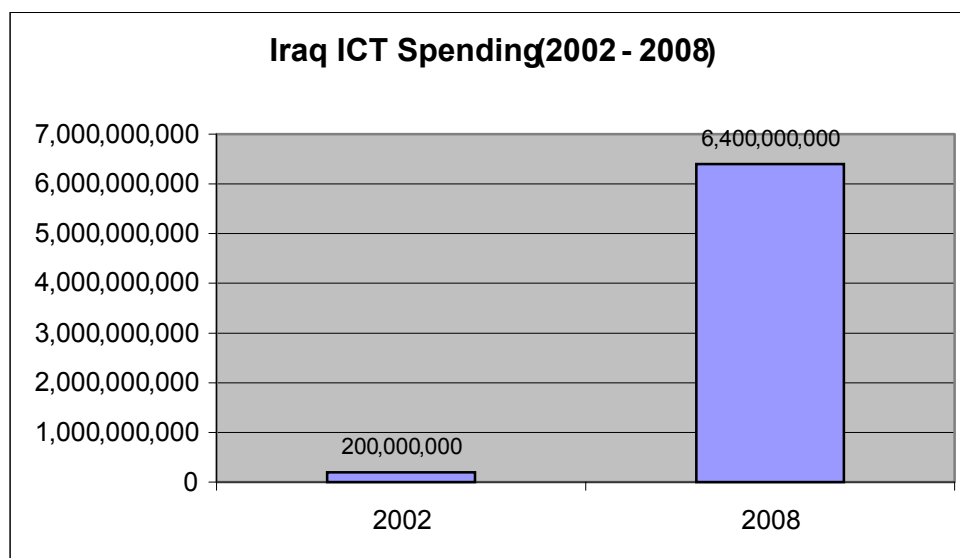
B. INVESTMENTS IN ICT

The greater part of Iraq's investment in the ICT sector has been in telecommunications over the last thirteen years. Contracts worth several hundred millions dollars were contracted, although many remained unfulfilled, due to UN sanctions and restrictions, as well as the breakout of the March-April 2003 war on Iraq. Investment in other aspects of ICT was to a much lesser extent, with contracts mainly for computer equipment and peripherals for the educational sector. In the list of blocked contracts under the "Oil for Food" program, there was about $10 million worth of computer equipment contracts with France, Malaysia and Jordan, as well as the United Arab Emirates and Lebanon.

TABLE 16. PARTIAL LIST OF TOP 10 COMPUTER EQUIPMENT CONTRACTS
BLOCKED UNDER UN SANCTIONS (PHASES V – VIII)

Phase	Contract Received	Mission	Exporter	Amount	Held by
V	Apr 1999	Malaysia	Prestigious Discovery	$3,750,528.00	USA
V	Apr 1999	Malaysia	Prestigious Discovery	$2,998,313.00	USA
V	Oct 1999	France	Euromark Ventures	$1,180,000.00	USA
V	Feb 2000	France	Cgg/France	$567,000.00	USA
VI	Sep 2000	Lebanon	Mayss S.A.L.	$350,000.00	UK, USA
VII	Nov 1999	Jordan	Al-Taif Scientific Co.	$323,760.00	USA
VI	Jul 2000	UAE	Global Resources Gt Enterprises	$277,096.00	UK, USA
VIII	Dec 2000	Jordan	Global Business	$269,789.28	UK, USA
VII	Aug 2000	France	Euromark Ventures	$164,500.00	UK, USA
VI	Dec 1999	Jordan	Euro-Gulf Trading Services	$105,291.50	USA

Source: United Nations in www.ccmep.org

Prior to the March-April 2003 war on Iraq, there was no direct foreign investment in Iraq over the past 13 years, in any sector, as a result of restrictions placed by the United Nations sanctions. With the end of the war, this is set to change dramatically. There is already great interest in the telecommunications sector, and particularly wireless networks, among both regional and international players. However, as a precondition to investment in the country, Iraq's legal system must be restructured and updated in line with the opening up of its economy. Regulatory authorities must also be established to guide the voice and data network sectors towards liberalization and privatization.

C. Government Facilitation

Under United Nations sanctions, conditions for the proper flow of goods and government regulation were lacking. An active black market dominated the import of ICT goods, with the blessing of government officials. The black market was, for a long period, the only means for the government to acquire ICT equipment. Even after Iraq was allowed to import some equipment through official channels, the black market remained its main source of ICT imports. Bribery and corruption governed the market, and taxation and regulation were imposed selectively.

D. Export of ICT equipment/software

Iraq does not export any ICT equipment or software, both due to sanctions against the country and also because there is no notable ICT industry in the country. The country is, instead, a net importer of technology.

VII. APPLICATIONS IN GOVERNMENT ESTABLISHMENTS

A. Computerization of public administrations & Digitization of Information

Prior to 1991, mainframe computers were available in a few government establishments, but it was only until the signing of the Memorandum of Understanding in 1996 between the United Nations and Iraq, that computers were imported, albeit on a limited scale, into Iraq and mainly for humanitarian purposes. Some government offices were equipped with computers, but most of the workflow was done manually and through traditional means.

Most notably, the Iraqi Ministry of Trade, responsible for the distribution of foodstuff under the "Oil for Food" program, relied on a computerized system to control the flow of humanitarian rations to the population. According to the 1998 ITU report on the telecommunications infrastructure of Iraq, computers were installed at almost half of the Ministry's 457 ration branch centers, as well as at the country's entry points and warehouses. However, these computers are not networked, and therefore government employees download the data on floppy diskettes and travel to the capital to deliver them for analysis and monitoring.

B. E-government and E-procurement applications

Given the dilapidated state of ICT in Iraq, and the lack of the necessary infrastructure for e-government and e-procurement ventures, these developments appear premature for the time being. Any incoming government will have to deal with more pressing requirements such as the repair of the country's telecommunications infrastructure, as well as the water and electricity networks, the rehabilitation of the educational system and the provision of basic services to the population.

Despite lack of ICT infrastructure, strategy and plan, and pressing national priorities that override any substantial technology development e-government in Iraq cannot be dismissed as part of the far future. The timid step taken by the deposed regime to publish government information on the Net is expected to be followed up by any new leadership keen to connect with the people and to project an image underpinned by good governance, transparency, freedoms and democracy. Technocrats will lead technology adoption, starting with the immediately available tools to improve government Web presence, to pushing for increased automation and networking. Regardless of the pace followed by the forthcoming Iraqi government to adopt technology, it is reasonable to expect a level of ICT infrastructure in place, capable of supporting basic e-government by 2005.

VIII. APPLICATIONS IN EDUCATION

There are no education-specific applications being used in Iraq's educational sector, and PC dissemination is negligible beyond a limited number of schools and higher education institutes. With the educational sector in shambles, Iraq's priority will be to rehabilitate schools (about 50 percent of schools are unusable due to deterioration and bombing), reduce overcrowding, update its curricula, and raise literacy among a population that has seen a dramatic rise in the number of school dropouts among students. With the increased PC penetration in schools over time, and the introduction of an ICT curriculum to a generation not familiar with the most basic of technologies, projects to disseminate e-learning and introduce virtual universities will gain ground, in a country spread out over an area of 437,072 sq km – comparable to France or California.

IX. APPLICATIONS IN COMMERCE AND INDUSTRY

E-commerce and e-business applications are not available in Iraq, again due to the lack of a mature market and the necessary infrastructure for such applications. The same applies to e-banking applications.

Banks in Iraq are unprepared for any form of e-banking in the present time. The country's 23 banks and their branches in the provinces are equipped with computers and peripherals, as well as basic finance and mainstream applications. However, the infrastructure necessary for e-banking, such as a reliable telecommunications network and a secure and high speed Internet network, as well as the availability of payment cards, is lacking.

The introduction of points of sale (POS), which accept international credit cards, in Iraq in May 2003 is an encouraging sign, though transactions are not yet carried through Iraqi banks, but through Jordanian ones. The move, however, is the first step towards building an electronic payment infrastructure, along with Automated Teller Machines, debit cards and Internet payment cards, in the coming few years.

X. APPLICATIONS IN HEALTHCARE

According to the ITU delegation that visited Iraq in 1998, a computer system similar to that of the Ministry of Trade was in place at the Ministry of Health and the state-run pharmaceutical company, Kimadia, to facilitate the distribution of medicine and medical supplies. Many of Iraq's 132 hospitals, 1500 primary healthcare centers, 52 private hospitals and numerous pharmacies were equipped with computers but lacked the network required to transfer the data between the various health sector establishments and the ministry.

In the Distribution Plan for Phase XII of the "Oil for Food" program, Iraq appeared prepared to invest substantially in the healthcare sector. Several orders for computers and equipment for use by this vital sector were placed. These included 150 data network systems to cover hospital administration procedures such as medical records, accounting and inventory. Another 900 computers and accompanying printers were requested for logging and filing procedures. Quality control seems to also have been prominent among the requirements of the Iraqi health sector, with an order for 30 computers dedicated for quality control of medical equipment. Assorted orders for computer equipment included one for 135 PCs with accompanying printers as well as 240 IBM compatible computers and Internet accessories.

As for core healthcare equipment, the Distribution Plan called for the import of various computer operated medical equipment such as fetal monitoring apparatus, MRI and CT scans, networked to other departments within the hospitals, as well as healthcare-related software such as 3159 units of professional database software for pacemaker follow ups.

There are yet no applications for telemedicine or teleconferencing in the Iraqi healthcare sector.

XI. DIGITAL ARABIC CONTENT

According to the Internet Software consortium, there are five level-3 domains registered under the Iraq country code, 'dot-iq', although they appear hidden or are reserved for internal use. However, most national Iraqi websites were registered under the dot-com or dot-net names. These included uruklink.net, babilonline.com, baghdadlink.net, iraq2000.com and warkaa.net, mostly hosted in Lebanon.

Content was predominately Arabic, with a few links to English texts and content. As stated earlier, content was mostly informational, and scant at that. Dead links abounded and pages remained under construction indefinitely. Most Iraqi websites have now gone offline and are unavailable. Several expatriates in Europe and the United States have registered and created websites on and for Iraq, such as school alumni and political opposition sites.

The removal of Internet censorship and filters on the Net in Iraq will encourage Iraqi individuals and establishments to create websites freely. Iraqi websites are expected to quickly proliferate, as the expertise among young Iraqis – as well as a heightened interest in information on Iraq – exists.

TABLE 17. DISTRIBUTION BY TOP-LEVEL DOMAIN NAME - JAN 2003

Domain	Hosts	All Hosts	Duplicate Names	Level 2 Domains	Level 3 Domains
.iq	5	5	0	2	5

Source: Internet Software Consortium (http://www.isc.org).