CHAPTER 4

UP-DATE: THE INTERNET IN THE KINGDOM OF SAUDI ARABIA

SECTION I

Introduction

This chapter up-dates the initial assessment of the development of the Internet in Saudi Arabia presented in the first of the Global Diffusion of the Internet Project reports[1] with research conducted through January 1999. Events leading to the official inauguration of public access Internet service in the Kingdom are reviewed, and the current state of the Internet within the country is assessed. As this report is being written in early 1999, the situation in Saudi Arabia is in transition. Companies are reserving domain names and IP address space, getting ready to move their Web sites into the Kingdom from their current off-shore locations, and setting up corporate intranets. Individuals will be able to sign up for service as soon as any of the 41 licensed ISPs have their installations and connections complete. The first will probably come on-line within the next two months. Estimates of likely up-take of the new service range from only 50,000 subscribers within the first year, due to government access restrictions,[2] to the government's estimate of 115,000 subscribers.[3]

Summary

Saudi Arabia will soon be the last country on the Arabian Peninsula to offer public access Internet service. The Internet Service Unit (ISU) of the King Abdulaziz City for Science and Technology (KACST) officially opened its network to licensed commercial ISPs in early January 1999, and public access will be available soon. The decision to allow such access had first been announced in April 1997, following several years of explicit study and deliberation.

In June 1998, proposals were submitted by companies seeking a license to become an ISP. In August, KACST announced the names of 71 that were deemed qualified to seek licenses. In December 1998, the names of the 40 companies that were to receive ISP licenses were announced at the same time that it was announced that the state telecommunications monopoly, the newly-"privatized" Saudi Telecommunication Company (STC) would also become a commercial ISP (i.e., the private sector ISPs were to compete with the public sector entity from which they would have to acquire their Internet connections). Port fees and price ceilings were also announced, the former being relatively high and the latter low enough to cause many would-be ISPs concern.

In late 1998, the STC established an international satellite link to the Internet in New York via AlterNet, a subsidiary of UUNET Technologies (now a subsidiary of MCI Worldcom).

"Public access" was to commence on 9 January 1999. Actually, this was the date on which the ISPs could expect to have their connections to the Internet, via the STC and ISU, activated. Actual public access will be available once the ISPs are fully operational. As of mid-January, about 500 IP addresses

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[1] Goodman, *et al*., *An Initial Inductive Study*, *op. cit*., pp. 207-218.

[2] "Internet Comes to Saudi," *IT News*, 4 November 1998, <http://www.ditnet.co.ae/html/newsnov/newsnov0198.html> (4 November 1998).

[3] "Saudi Arabia: In Brief," *Middle East Economic Digest* 42 (6 November 1998), p. 30.

were active, more than 80 percent of which were associated with the KACST or ISU, but there were no signs that any ISPs were open for business. Many of the active IP addresses appear to be router ports associated with the complex system of firewalling set up by the ISU, which is responsible for implementing what is likely the most extensive attempt at Internet content access control in the world.

Conclusions

Public access to the Internet is imminent in Saudi Arabia. The demand for service appears to be highest in the commercial sector, although there is significant personal interest as well. The government estimates that more than 100,000 subscriptions will be opened in the first year of service, a figure that likely includes users on connected corporate intranets.

The STC has established a link to the Internet independent of the telemedicine link from the King Fahd Specialist Hospital and Research Center (KFSHRC), and is setting up a domestic infrastructure to facilitate interconnection of ISPs in every province and major city with the ISU in Riyadh. While Telecommunications Expansion Project 6 (TEP-6) significantly improved and expanded inter-city links with fiber optic cabling and digital transmission, subscriber access will be limited by the variable quality of local loop connections. TEP-7, currently in progress, and the proposed TEP-8 should address these concerns. There do not appear to be any plans at present to establish an IP backbone/intranet separate from the STC's public switched telephone network (PSTN) infrastructure.

It appears that the Saudi government has devoted significant resources to establishing a complex technical base with which to strictly limit Saudi subscribers' access to foreign Internet hosts. The goal appears not merely to block objectionable sites, a technique used in neighboring countries and often by-passed, but install a fool-proof system that limits communications to approved channels using a network of gateway routers, firewalls, and proxy servers. In addition to hardware controls, sophisticated software tools such as WebSENSE (from NetPartners Internet Solutions Inc. of San Diego, California) may also be in use.

While there has been some negative commentary in the foreign press and dire warnings from dissident groups regarding content access controls in Saudi Arabia, there is virtually no discussion, certainly no negative comments, in Saudi sources. Most commercial and government proponents of the Internet agree that some control is necessary. The commercial sector is unconcerned so long as business communications are not hindered. Public reaction remains to be seen. There are reports that the restrictions will indeed be Draconian.[4] If this is the case, there may be some public outcry. However, should the restrictions not be apparent to the average new Web-surfer, the public's desire for Internet access—of any sort—will likely outweigh any concerns over controls, just as has been the case in neighboring UAE.

[4] See, for example, "Internet Comes to Saudi," *op. cit.*, which quotes unidentified "industry insiders" as saying that, rather than blocking undesireable sites, the ISU system will allow access only to a restricted list of officially sanctioned sites.

SECTION II

Analysis: Internet Developments in the Kingdom

Background The Kingdom has had an Internet connection since 1994, when the KFSHRC established a satellite link to Bethesda, Maryland, via the International Medical and Educational Data Link (IMED). The connection and limited Saudi Internet infrastructure was managed by the Washington Coordinating Center, which also hosted official Saudi government Web sites in the United States. Access to the Internet in Saudi Arabia from 1994 through 1999 was limited to selected staff at the KFSHRC, KACST, and King Saud University (KSU), all Riyadh-based organizations. KACST was linked to KFSHRC via microwave, and KSU staff accessed the Internet at KACST (there being no link to the nearby KSU campus).

A few commercial organizations, such as Saudi Aramco, have had private Internet links for several years. Use of these links is limited to company business, and access is strictly regulated.

Public access to the Internet, with significant restrictions, was approved by the Council of Ministers in April 1997 after two years of investigation and deliberation on the part of most government constituencies. The Council decided that KACST should be the sole international connection point for the Internet, and that an unspecified number of ISP licenses be issued to private companies which would be connected to the Internet via KACST. KACST was to maintain a firewall, or other appropriate technology, to screen the Saudi masses from "inappropriate" material, principally pornography, other information in contravention of strict Islamic values, and anti-government (anti-House of Ibn Saud) propaganda. Dr. Salih al-'Adhl, president of KACST, said that they would be "careful to install the necessary technology and programs to protect society from the negative aspects of this network."[5]

In February 1998, al-'Adhl announced that public Internet services would be available in "three to six months."[6] This was to prove to be an overly optimistic estimate. Aside from the technical aspects, there were powerful commercial (and Royal) entities competing for the right to become the exclusive ISP in Saudi Arabia.[7] By May, the KACST had established the Internet Service Unit (ISU), which was to maintain the national Internet hub and firewall, as well as oversee the ISP licensing process. A briefing for prospective ISPs was held at KACST on 5 May 1998 to provide background information on the procedures. At that time, the Arabic Information Network, a local consultancy, estimated that 45,000 subscribers would sign up for Internet service within the first year.[8]

The task apparently overwhelmed the KACST, however, which hired Mannheim (Germany) University's *Gesellschaft für Technische Zusammenarbeit* (GTZ, Society for Technical Cooperation) as its consultant in June 1998. GTZ assisted KACST/ISU with both technical and organizational

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[5] Mahdi Abu-Fatim, "Official on Introduction of Internet Into Kingdom," *Al-Riyadh* (Riyadh) (6 December 1997), p. 27, as reported in FBIS-NES-97-348, *Daily Report: Near East & South Asia* (16 December 1997), via World News Connection.

[6] Khalid al-Fayiz, "Internet Available to All Saudis in Six Months," *'Ukaz* (Jeddah) (24 February 1998), p. 9, as reported in FBIS-NES-98-058 (4 March 1998), via World News Connection.

[7] See, for example, the discussion of the early jockeying for position in Goodman, *et al*., *An Initial Inductive Study*, *op. cit*., pp. 216-217.

[8] "Saudi Arabia: Internet discussions planned…," *Middle East Economic Digest* 42 (8 May 1998), p. 28.

matters, prepared the Request for Proposals (i.e., application forms) for would-be ISPs and a business plan, and conducted a market survey. GTZ's initial estimate placed the Internet market in Saudi Arabia at a minimum of 30,000 subscribers. The group intended to commence pilot services by September 1998 with a goal of having at least the Dammam area fully on-line by the end of the year.[9] Companies that cared to obtain a sizable bank guarantee against potential future fines and could afford the expensive connections were invited to compete for five-year, renewable, non-transferable licenses to offer public Internet access services within specified services areas.[10] By the 3 June deadline for submitting applications, more than 200 companies had expressed interest in becoming ISPs[11] and at least 160 of them had formally applied for licenses.[12] By July, the Riyadh Chamber of Commerce concluded that service would be available in Dammam, Jeddah, and Riyadh "around" January 1999, and that the total Internet market was 120,000 subscribers.[13]

In early August, the KACST announced the names of the 71 companies that had "qualified" to become ISPs (see Tab G). It was expected, but not official policy, that all companies that qualified would receive licenses at some unspecified future date.[14] However, on 11 August, Fahad al-Hoymany of the KACST's ISU noted that they had yet to decide how many of the qualified companies would actually receive licenses. He reiterated, however, that services should commence before the end of the year.[15] The ISU subsequently announced that it would accept ISP license applications from qualified companies through 21 September 1998,[16] and announce the list of licensees in mid-October with a view toward having them begin service in December. Abdullah Musa, in charge of Internet services at KACST, speculated that the total number of subscribers in the first year alone would reach 115,000.[17]

Also in August, Al-Hoymany confirmed that "firewalls … would block access to sites considered sensitive." He further noted that the STC "was setting up servers across the country to handle the data traffic."[18] Although it was not stated, this implied that domestic backbone connections would be provided exclusively by the STC. Since "last mile" local loop connections are also the exclusive province of the STC, ISPs will apparently be limited to handling subscriber accounts, i.e., customer service.

The list of licensed ISPs was finally released on 4 November (Tab G), at which time it was announced that service would begin in January 1999.[19] Forty companies made the cut, plus a license was also given

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[9] "Saudi Arabia: Internet adviser appointed," *Middle East Economic Digest* 42 (12 June 1998), p. 24.

[10] N.J., "Internet In Saudi Arabia," *ArabiaTech*, 9 September 1998, <http://www.arabia.com/content/tech/9_98/SaudiCover.9.9.98.shtml> (5 October 1998).

[11] "Saudi Arabia: Internet adviser appointed," *op. cit.*

[12] Agence France-Presse, *Saudis near end of seven-year wait to surf the Net* (15 July 1998).

[13] *ibid.*

[14] "List of ISPs Qualified by King Abdulaziz City for Science & Technology," *ArabiaTech*, 10 August 1998, <http://www.arabia.com/content/tech/8_98/saudi_10.8.98.shtml> (5 October 1998).

[15] Reuters, *Saudis to get local Net access* (11 August 1998); Edmund Blair (Reuters), *Saudi surfers await cheap, accessible Internet* (19 August 1998).

[16] N.J., "Internet In Saudi Arabia," *op. cit.*

[17] "KACST to licence internet providers by mid-October," *Middle East Economic Digest* 42 (18 September 1998), p. 16; "Saudi Arabia's new ISP's due to be revealed," *Middle East Communications* 13 (October 1998), p. 8.

[18] "Saudis to get local Net access," *op. cit.*

[19] "Internet Comes to Saudi," *op. cit.*

to the STC, giving the state's telecommunications monopoly not only the key role in interconnection but a chance to compete for end-users as well. Licensed ISPs were to demonstrate some capability within one month of receiving a license and open their networks to the public within six months of licensing, or their licenses would be revoked.

Leased lines will be provided by the STC for connections between KACST and the ISPs at speeds of 512 kbps, 1.024 Mbps, 1.536 Mbps (T-1), and 2.048 Mbps (E-1). Fees for these lines, estimated to run about SR 56,000 (US$15,000) per month for 512 kbps,[20] will be in addition to the KACST port fees, which are already exorbitant (Table 1).[21]

Table 1. KACST Internet Port Fees

Speed	Installation Fee	Monthly Fee
512 kbps	SR 24,000 (US$6,400)	SR 112,000 (US$29,862)
1.024 Mbps		SR 224,000 (US$59,725)
1.536 Mbps		SR 336,000 (US$89,588)
2.048 Mbps		SR 448,000 (US$119,450)

The implications of having to compete with the public sector for Internet subscribers were not lost on the newly-licensed ISPs, especially since the STC and ISU had already fixed the fees that the ISPs would have to pay to the government agencies for their Internet links and telephone access lines and the ISU had also capped the fees that the ISPs could charge subscribers (Table 2). Additionally, since each ISP would only be allowed 130 modem connections,[22] the total number of subscribers that could be provided acceptable service by each ISP has been effectively capped, thereby severely limiting the revenue potential from dial-up subscribers.

Table 2. Dial-up Subscriber Fees[23]

	Maximum	Minimum
Monthly fee	SR 150 (US$40.00)	SR 100 (US$26.66)
Hourly fee, of which	SR 9 (US$2.40)	SR 6 (US$1.60)
ISP component	SR 4.5 (US$1.20)	SR 1.5 (US$0.40)
STC component	SR 4.5 (US$1.20)	

Significant prohibitions apply to Internet service provision in Saudi Arabia. These include establishing an independent link to the Internet, accessing a foreign system on the Internet without permission and/or endangering the local network "by visiting insecure sites," and the conduct of "illegal operations." Illegal

[20] "Saudi Arabia Ready for the Internet: A Web of complications," *Mideast News*, 18 January 1999, <http://www.mideastnews.com/saudinet.html> (19 January 1999).

[21] N.J., *op. cit.*

[22] "Saudi Arabia: In Brief," *Middle East Economic Digest* 42 (25 December 1998), p. 25.

[23] Sources: "KACST sets price limits for internet providers," *Middle East Economic Digest* 42 (20 November 1998), p. 18; Reuters, *Saudi Sets Limits to Internet Provider Charges* (10 November 1998).

operations include (but are probably not limited to) vice and gambling, violation of copyrights or intellectual property laws, spreading rumors or communicating threats, sending encrypted messages without "permission from the pertinent authorities," and hacking.[24]

Network Developments Since establishing the ISU last summer, KACST has been aggressively putting into place the physical plant required to ensure "foolproof" screening of Saudi subscribers from the Internet at large. Table 3 shows the growth in the number of active IP addresses in the address space assigned to the Kingdom. KACST has had a minimal presence on the Internet since 1994, being the *.sa* national top-level domain (TLD) manager. However, until late 1998, most Saudi hosts were associated with the KFSHRC. Today, the KACST and ISU IP addresses comprise more than 80 percent of Saudi connections.

Table 3. Growth of the *.sa* TLD in active IP addresses[25]

Date	1/94	7/94	1/95	7/95	1/96	7/96	1/97	7/97	1/98	7/98	1/99
Total	0	1	2	18	27	275	(0)	293	(37)	(42)	493
KACST/ISU	(not separately counted)										401

Not all of the IP addresses counted for Table 3 represent host computers on the Internet; many are routers. While none of the canonical names correlated with IP addresses (only 143 have been identified) explicitly identify the associated machines as routers, the extensive pairing of gateway connections with organizational or ISP links (e.g., ksu.gw.isu.net.sa and saudi1-gw-ser8-0-1.isu.net.sa), with separate pairs for domestic and international connections, suggests that these IP addresses are assigned to router ports. Such explicit addressing of router ports is useful for implementing strict firewall regimes. We have tentatively identified 165 IP addresses as being assigned to routers. This is roughly consistent with the estimated requirement for two pairs of addresses (one each for domestic and international traffic) for each of the 40 commercial ISPs.

Little information is available about the equipment used to build out the commercial Internet infrastructure in the Kingdom. The ISU was reported to be relying heavily on Sun Microsystems for servers and Cisco Systems for routers.[26] Sun Microsystems is also providing Starfire servers, using a

[24] *ibid.*

[25] Sources: 1991-1997: Network Wizards, "Host Distribution by Top-Level Domain Name," *Internet Domain Survey, (month, year)*, <http://nw.com/zone/summary-reports/report-yymm.doc>; 1/98: Network Wizards, "Distribution by Top-Level Domain Name," *Internet Domain Survey, January 1998*, 6 February 1998, <http://www.nw.com/zone/WWW/dist-byname.html>; 7/98: Network Wizards, "Distribution by Top-Level Domain Name," *Internet Domain Survey, July 1998*, 12 August 1998, <http://www.nw.com/zone/WWW/dist-byname.html> (14 August 1998); 1/99: GITAG name and ping scans, January 1999. Numbers in parenthesis are obviously erroneous. In 1998, Network Wizards changed its methodology to function better in the new security environment, but the results have been inconsistent.

[26] "KACST to licence internet providers by mid-October," *op. cit.*; repeated in *Middle East Economic Digest* articles on 6 and 20 November 1998.

Solaris (Sun-proprietary Unix variant) operating system, to Saudi Aramco as part of the oil company's "business systems integration program" to network 20,000 company users nationwide.[27]

Some Newbridge Networks Corporation routers are also in use. Six IP addresses associated with the name "newbr" are assigned to two Saudi organizations; two of these addresses (one for each organization) are identified as proxy test connections. (A total of 19 KACST/ISU and two commercial IP addresses have been associated with names including the "proxy" designation.)

Although the proxy system is under the purview of the ISU, some or all of the servers have been located at STC facilities, according to the company's Chairman. Collocation of the servers at STC switching centers facilitates connecting them directly to the country's asynchronous transfer mode (ATM) backbone.[28]

Saudi Internet addresses are clustered in four groups, two each for the KFSHRC and KACST/ISU and subordinate ISPs:

??195.128.0.0-195.128.16.255	KFSH-1, 1 domain (kfshrc.edu.sa), 231 hosts
??199.75.86.0-199.75.95.255	USUSP-MO-MD-US (US Universities/Saudi Project), 3 domains (kfshrc.edu.sa, imedlink.net, saudi.net), 63 hosts, some in the United States (imedlink.net and saudi.net)
??198.77.88.0-198.77.103.255	SAUDI-COL, 9 domains, 62 hosts, principally KACST, but including several universities and the Ministry of Higher Education
??212.26.0.0-212.26.127.255	SA-KACST, at least 27 domains, 339 hosts, including ISU and those licensed ISPs that have registered address space

The first three blocks are managed by the Washington Coordination Center, a unit of IMED that has been responsible for the provision of networking services to the Kingdom via KFSHRC up until the present. The last block is managed directly by the KACST Network Information Center. All identified proxy and gateway/router addresses fall within this fourth block.

KACST had originally designated the four C-blocks 198.77.88-198.77.91 as its "private" network for connecting the buildings on its campus. A single C-block, 198.77.103, was to be the "public" network for ISP connections.[29] The establishment of a separate block for the ISU relieved KACST from reassigning some of its IP numbers to ISPs, although one company (Al-Qimam), several universities, and the Ministry of Higher Education maintain servers within two of KACST's blocks as well as in the ISU block.

[27] "Saudi Arabia: In Brief," *Middle East Economic Digest* 42 (25 September 1998), p. 29.
[28] Abdelghani Khatib, "Privatisation in Saudi Arabia," *Middle East Communications* 13 (October 1998), p. 31.
[29] Yusuf Mansuri, *IP Number allocation*, Final Draft, National Communication Networks (15 March 1997).

Walid Abal Khail, of the Riyadh Chamber of Commerce and Industry, estimated that 30,000 Saudis were using off-shore Internet accounts in mid-1998,[30] and that there were another 8,000 "local" users (i.e., people who log on to Saudi-based servers) at that time.[31] No current estimates of the number of users are available, but there most likely has been only a modest increase over the past year as a result of licensed ISP technical personnel working on their intranets. As noted earlier, the likely immediate demand is in excess of 100,000 users. There are no estimates of potential total demand. The high levels of potential academic and commercial users, coupled with PC penetration rate (>3 percent), suggest that the demand could exceed 500,000 subscribers, should the network be able to support such numbers. The current port allocations are such that fewer than 90,000 commercial subscribers could be provided adequate service unless the network is appreciably expanded.

Dimensions Figure 1 depicts and Table 4 summarizes the dimensions of Internet diffusion in Saudi Arabia. Despite the rapid and significant changes in many aspects of the Internet in the Kingdom over the past year, the only dimension that increased was *organizational infrastructure*, due to the licensing of commercial ISPs.

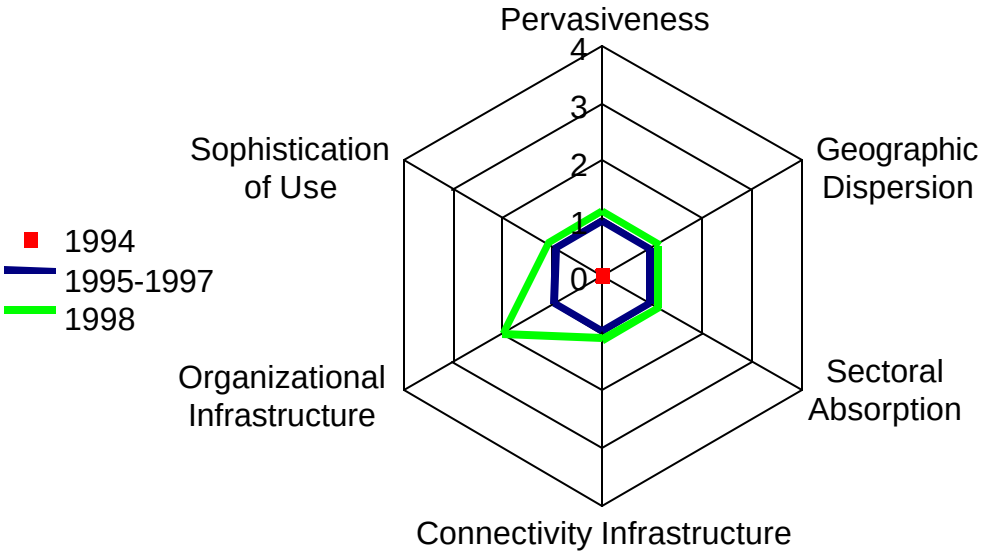

Figure 1. Internet Dimensions for Saudi Arabia, 1994-1998

Pervasiveness The past year has seen only a small growth in the number of Internet users in the Kingdom as networking professionals from newly-licensed ISPs started building and connecting their networks to the Internet. The establishment of the ISU and initial connection of several new ISPs has resulted in a large increase in the host count. Although the hosts per capita ratio is indicative of Level 2 *pervasiveness*, the low number of users and the fact that these hosts are generally accessible keeps the dimension at Level 1. Although estimates vary regarding the number of likely users who will log on

[30] Agence France-Presse, *Saudis near end…*, *op. cit.*; M.A.P., "Connecting with the Saudi's," ArabiaTech, 2 July 1998, <http://arabia.com/content/tech/7_98/saudi_2.7.98.shtml> (6 July 1998). The latter article notes that Bahrain alone hosts an estimated 15,000 Saudi Arabian dial-up accounts.

[31] Human Rights Watch, *Saudis surrender to cyber reality* (19 July 1998).

during the first year of public access, if even the lowest estimate is met, there will be more than one user per thousand population (i.e., Level 2); at the high end there could be as many a seven per thousand.

Dimension	Level	Explanation
Pervasiveness	(1) *Embryonic*	It continues to be the case that fewer than one in 1,000 Saudis has access to the Internet. Network expansion preparatory to public service offerings has resulted in the connection of about more than 200 hosts per 10 million people (Level 2), but these hosts are not yet generally accessible. (pending change)
Geographic Dispersion	(1) *Single Location*	There are no Internet points-of-presence except in Riyadh, but connections to other main cities are being established. (pending change)
Sectoral Absorption	(1) *Rare*	Less than 10 percent of the country's public, health, or commercial sector organizations are connected to the Internet. Academic sector representation is moderate. (no change)
Connectivity Infrastructure	(1)	The infrastructure is being expanded, but is still minimal. The domestic backbone and international links are of relatively low speed. Access will soon be more widely available. (on-going change)
Organizational Infrastructure	(2) *Controlled*	Numerous ISPs have been approved for licenses, although the market remains tightly controlled and barriers to entry are very high. All connections are effected through a government site. (+)
Sophistication of Use	(1) *Minimal*	Lack of Internet availability continues to hamper the development of expertise and the assimilation of the Internet into routine use. However, the technical community has demonstrated considerable expertise and the commercial community has extensive off-shore experience. Once public access is available, the sophistication of use will quickly rise to conventional. (pending change)

Table 4. Internet Dimensions for Saudi Arabia

Geographic Dispersion The only Internet points-of-presence (POP) in the country are still located only in Riyadh, although POPs are scheduled to be opened in Jeddah and the Eastern Province (principally in Dammam) during the first quarter of 1999. There is no dedicated Internet backbone, nor is one planned. Interconnections will be carried via the STC's new ATM network. Currently, the STC is estimated to have the switching and backbone capacity to handle only about 10 percent of the

anticipated first-year Internet traffic.[32] Thus, the number of dial-up lines allocated to each ISP will be limited until such time as the STC's infrastructure has sufficiently matured, perhaps some time during this year. It is intended by the Saudi government that every province have local Internet service available. No concrete plans for making this happen have been announced, however, nor does there appear to be a definite time frame.

Sectoral Absorption There has been very little change to *sectoral absorption*. Universities have seen the number and quality of their connections increase, but no new educational institutions have been brought on-line. Whether primary or secondary schools will get Internet connections has no been determined. The Ministry of Higher (i.e., tertiary and professional) Education is on-line, but not the Ministry of Education. Several Saudi businesses have been recently connected to the Internet, and more will likely follow this year. These are principally companies bringing their existing Web presence "home" from off-shore servers. Ultimately, it is unlikely that more than 10 percent of the Saudi commercial establishment will be on-line. The KFSHRC continues to serve the needs of the health community, at least in principle. The number of health facilities with Internet access is not known. Government presence on the Internet, with the exception of KACST and the ISU, is minimal.

Connectivity Infrastructure The domestic infrastructure and commercial international connections for Internet service rely entirely upon the telecommunications network of the STC. Dial-up and leased-line subscribers will connect to their ISPs via STC lines. The ISPs will in turn be connected to the ISU via STC circuits, and the ISU is itself connected to the Internet via an STC-operated satellite link. Despite huge investments over recent years, the network cannot meet current demands for conventional telephone services. As noted in *Geographic Dispersion*, the number of subscriber connections allowed will be limited at least over the near term (1999) by the STC due to a lack of supporting infrastructure. Subscriber access, when it becomes available, will be via dial-up lines and modems or leased lines at 64 Kbps. The access speeds available on dial-up lines will be limited by the ISPs' equipment, which will probably permit access at speeds up to 56 Kbps, and local loop line quality, which varies greatly throughout the Kingdom and even within individual cities.

Organizational Infrastructure This dimension has been raised to Level 2 by the decision of the Saudi government to issue ISP licenses to 40 companies in addition to the state's monopoly telecommunications carrier. However, this was done not to introduce competition but rather as a convenience to the government, which is aware of the STC's inability to meet the market demand for Internet services. Price competition will be allowed within a narrow window of minimum and maximum prices fixed by the state, which also fixes the fees charged to the ISPs for their connections and fees that subscribers pay for their basic telephone service. The high costs levied on the ISPs, effective capping of their revenue streams through price and access line limits, and other measures such as the large bank guarantees required in anticipation of future fines, combine to keep the barriers to entry very high. Above and beyond the economic and bureaucratic barriers, the state is the final arbiter of who may have a license.

[32] "Saudi Arabia Ready…," *op. cit.*

Sophistication of Use Although those who use the Internet routinely, especially Saudi networking technicians, have shown significant skills with the technologies involved, Internet access is still too rare for the *sophistication of use* to merit a "conventional" rating. The ISU's methodology for setting up a foolproof filtering and firewall system appears especially ingenious; whether it is indeed foolproof remains to be seen. Once the Internet is more widely available in the Kingdom, we expect the level of sophistication to increase to Level 2 rather quickly. Especially in the commercial sector, technical personnel have gained significant Internet-related experience through the development of IP-based intranets and the development and maintenance of off-shore Web sites. Over the next several years, however, it is most likely that the Internet will augment or replace existing processes (e.g., e-mail or on-line purchasing) rather than spawn wholly-new ways of working.

Determinants of the Saudi Internet's Development

There have been few changes in the determinants of Saudi Internet development or their impact on that development. The government's desire and ability to strictly control such important aspects of Internet development as the licensing and operations of ISPs, the provision of links to both subscribers and the Internet, and communications content have resulted in not only the very late offering of public Internet access (relative even to elsewhere in the region, much less the world at large) but in a very constrained Internet environment. Barring any significant changes in this situation, and none are in prospect, the Internet will flourish, languish, or wither away at the government's wish and command. Table 5 recaps our earlier assessment[33] and notes recent changes (in red).

Problems and Prospects

The perception that the Saudi government believes the Internet to be Pandora's mythical box made real is inescapable. The evils that could be unleashed by the Internet take the form of multiple types of information, especially political, religious, and sexual (i.e., pornographic). Muhammad Mas'ari, head of the London-based Saudi dissident group Council for the Defense of Legitimate Rights (CDLR), recently opined that the government is already too late. According to Mas'ari, "[t]he country is already awash with immoral material broadcast through satellite television, everybody's diversion in a country where public entertainment is almost non-existent."[34] But the Internet is not television: access is more difficult, requiring expensive equipment and specialized knowledge (at least more than is required to operate a television set) on the one hand, but the information potentially available is more extreme in every "undesirable" category on the other.

There is a belief, perhaps only a hope, that this "box" can be partially opened, keeping the evil within and letting only that which is useful or at least benign into the Kingdom. To this end, an apparently huge sum of money and great effort over an extended period of time have been expended to build a foolproof system to insulate Saudis from the evils of the Internet (as defined by the government). It is questionable whether such extreme measures are necessary. Witness the apparently acceptable level of filtering and control accomplished by the much less complex proxy server system used in the neighboring United

[33] Goodman, *et al.*, *An Initial Inductive Assessment*, Table 87, p. 215.
[34] "Saudi Arabia Ready…," *op. cit.*

Arab Emirates. But the Kingdom is not the UAE, having neither alcohol nor Asian all-girl rock-and-roll bands for diversion, nor even an uncensored issue of the International Herald Tribune, so they may indeed required a more foolproof system.

Table 5. Determinant Impact

Determinant Quality	Affected Dimension
State monopolization of telecommunications	Pervasiveness—Severely limited by inadequate infrastructure and high prices Organizational Infrastructure—Limited by explicit government policy and economic disincentives (i.e., state-fixed fees and prices)
Intent to control information content and flow	Pervasiveness—Potentially very restrictive policies may constrain Internet take-up Sectoral Absorption—Internet use by commercial sector and individuals may be constrained by restrictive information policies; government participation may be limited in order to limit potential for access to certain types of official information
Internal security concerns	Pervasiveness, Sectoral Absorption—Explicit controls on Internet access and use to prevent use by dissidents may limit use by others
Responsiveness to cultural and religious concerns	Pervasiveness—Concerns to protect society from harmful influences may constrain Internet use to a point where it is not attractive to a meaningful segment of the potential user population Organizational Infrastructure—Desire to constrain Internet access will likely mandate the maintenance of a small provider community
Technology investment policy	Connectivity Infrastructure—Acquisition of modern technology is a high priority that will speed the improvement and expansion of the supporting telecommunications infrastructure
Geographic obstacles to development	Geographic Dispersion, Connectivity Infrastructure—Pockets of population widely separated by deserts makes establishment and maintenance of terrestrial links difficult.
Basic but improving telecommunications infrastructure	Geographic Dispersion, Connectivity Infrastructure—Internet use is constrained by poor telephone lines in many areas. The nationwide digital backbone is inadequate to meet projected Internet requirements.
Strong central authority	Pervasiveness, Sectoral Absorption—Internet users, private and commercial, connect at the sufferance of the government, which may choose to limit the number of accounts or preclude Internet use by specific individuals or whole classes of people. Organizational Infrastructure—Maintenance of central control dictates the establishment and maintenance of limited access routes
Evolving stakeholder communities	Sophistication of Use—A younger generation, educated in the West and more technically literate, is coming to the helm at public and private organizations. These new leaders are better able to integrate advanced technology into their operations, and are more open to modifying their operations to take advantage of new technologies.

The Saudi government may be too clever by half, however, having potentially undermined its Draconian content controls with its own economic disincentives for ISP licensing and public access. The former, in the form of high fees charged the ISPs accompanied by price ceilings and limitations on subscriber connections (albeit for technical reasons), will keep the number of ISPs low and the number of potential Internet access points correspondingly low. Would-be subscribers will have a hard time getting an account, first of all, and a connection once signed up for service. Although the capped prices are low enough to cause would-be ISPs concerns about potential revenue generation, they are high enough to keep the *hoi polloi* off-line. Other constraints, such as the cost of PC ownership and attendant skill requirements, also affect the lower strata of society negatively, but high costs will also keep public access points such as Internet cafés from flourishing. Meanwhile, those who can afford access might do better to keep their accounts off-shore and unfiltered. For light users, the cost of an international call to a free (to international callers) Batelco Internet account is SR 3/minute (SR 180/hour). Use of a calling card could bring that cost down to SR 120/hour or less. The cost of using a domestic Saudi ISP to access the Internet for an hour per month, at the high end of the allowed pricing window where all Saudi ISPs are expected to operate, is nearly comparable: SR 159 for the access plus at least SR 3 for the telephone calls (the STC is increasing the cost of local telephone calls to SR 0.5/minute, an increase of 500 percent). Even Batelco's reportedly content-constrained Internet access is far more open than that to be available in the Kingdom. Of course, for heavy Web surfers, off-shore accounts are out of the question except for the very wealthy, presumably of less concern to the government than the population in general in any event.

One indicator of the extent to which the government is willing to go to control Internet access is the denial of an ISP license for *SilkiNet*, one of the many ventures of the King's nephew, Prince Al-Waleed bin Talal bin Abdulaziz. The absence of *SilkiNet*'s name from the list of licensees has gone largely unremarked, although the company's pre-qualification for a license resulted in a flurry of press releases.[35] *SilkiNet* is a joint venture of the Prince's Silki-la-Silki company with Kuwait's ZakSat, a provider of hybrid satellite-terrestrial Internet service similar to Hughes Network Systems' DirectPC.[36] Although ZakSat's services are available even in Iran (where Internet content is also constrained and satellite television dishes are illegal), the service was apparently considered insufficiently controllable by the Kingdom's authorities. (An interesting company to watch in this regard is Al-Alamiah, which was reported to be a partner in *SilkiNet* in 1997 but which has not been mentioned in subsequent press releases. Although Al-Alamiah did not appear on the list of companies pre-qualified for an ISP license, it received one nonetheless. Perhaps this will be used as *SilkiNet*'s back door into the Saudi ISP market. If so, given the high-level sponsorship of the company, it is likely that the government will conveniently fail to notice the company's use of satellite dishes so long as the company maintains an acceptable list of clients.)

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[35] See, for example, M.A.P., "Silki La Silki Accredited ISP," *ArabiaTech*, 5August 1998, <http://www.arabia.com/content/tech/8_98/silki_5.8.98.shtml> (24 August 1998). The last time that *SilkiNet* issued a flurry of press releases was in May 1997, immediately following the announcement that Internet access would be permitted in the Kingdom. The company claimed at that time, rather prematurely, to be the first ISP in the country. See Javid Hassan, "New joint venture to facilitate Internet access in Kingdom," *Arab News* (Riyadh) (15 May 1998).

[36] Outbound communications from the subscriber to ZakSat are via landline, inbound Internet content is received via a high-speed satellite relay from a coordinating center in the Philippines.

The date for the opening of the Internet to the public has been pushed back numerous times since the first announcement in April 1997. The next several months will likely see additional delays as the complex system of gateways and firewalls is connected to the ISPs and dial-up lines are put in place. The most-recently announced date for public Internet access was 9 January 1999, one of the goals being to start service during the Muslim holy month of Ramadan, but that date turned out to be the date on which the ISU started enabling the connections to the ISPs, most of which are themselves not ready to offer service. The STC recently speculated that it would take until March to get the IP backbone circuits and local loop connections in place, and the current estimate is that the public will finally be able to log on in April 1999, two years to the month after the decision to allow such connections was made and about four years in all since the issue was first seriously discussed in the Kingdom. Slow by Western standards, absolutely glacial by the ever-shrinking time scales of information technology evolution, but on the whole not a bad performance by one of the world's most conservative and paternalistic governments. Once public access is available, the interplay between market demand and the inability of the ISPs to meet this demand due to the various limitations, both explicit and incidental (e.g., lack of local loop connections), should be interesting. Of most interest will be the reaction of the business community should the government's restrictions be seen to be hindering commerce, and the government's response to that reaction.

Tab E **SAUDI GLOSSARY**

CDLR	Council for the Defense of Legitimate Rights—A dissident group, based in London, opposed to the current government of Saudi Arabia <www.ummah.org.uk>
GTZ	*Gesellschaft für Technische Zusammenarbeit* (Society for Technical Cooperation) (Mannheim, Germany)—The consultant hired by KACST to help establish the ISU and implement public subscription Internet services in Saudi Arabia.
IMED	International Medical and Educational Data (Link)—An ISP in Bethesda, Maryland
ISU	Internet Services Unit—The division of KACST that licenses ISPs and manages public access to the Internet.
KACST	King Abdulaziz City for Science and Technology (Riyadh)—KACST is the *.sa* national TLD manager.
KFSHRC	King Faisal Specialist Hospital and Research Center (Riyadh)
KSU	King Saud University (Riyadh)
SR	Saudi Riyal (US$1 = SR3.75)
STC	Saudi Telecommunications Company—The monopoly telecommunications services provider in Saudi Arabia
TEP	Telecommunications Expansion Project

Tab F **KEY SAUDI ORGANIZATIONS**

Internet Services Unit
Abdullah Othman al-Musa
c/o King Abdulaziz City for Science and Technology
P.O. Box 6086
Riyadh 11442
URL: www.isu.net.sa

King Abdulaziz City for Science and Technology
Dr. Saleh Abdulrahman al-Athel, President
P.O. Box 6086
Riyadh 11442
Telephone: +966 1/488 3069
Facsimile: +966 1/488 3756
URL: www.kacst.edu.sa

King Fahd Specialist Hospital and Research Center
Badr Al-Saleh <badr@kfshrc.edu.sa>
P.O. Box 3354
Riyadh 11211
Telephone: +966 1/442 7815
URL: www.kfshrc.edu.sa

Ministry of Post, Telegraph, and Telephone
Dr. Ali Talal al-Johany, Minister
Sharia al-Maazer, Intercontinental Road
Riyadh 11112
Telephone: +966 1/463 7113
Facsimile: +966 1/403 2048

Saudi Network Information and Operations Center
Abdulaziz Hamad al-Zoman <zoman@kacst.edu.sa> or <ipreg@saudinic.net.sa>
c/o King Abdulaziz City for Science and Technology
P.O. Box 6086
Riyadh 11442
Telephone: +966 1/481 3208
Facsimile: +966 1/488 2959

Saudi Telecommunications Company
Engineer Abdelrahman al-Yami, CEO

Washington Coordinating Center (a.k.a. IMED Link)
Garry Pammer
<garry@imedlink.net> or <pammer@ususp.mo.md.us> or <pammer@saudi.net>
10401 Old Georgetown Road, Suite 408
Bethesda, Maryland 20814
Telephone: +1 301/897 0011
Facsimilie: +1 301/530 2728

Tab G **SAUDI ISPs**

August 1998: 71 companies pre-qualified for ISP licenses[37]

Abdulla Fu'ad Company
Abdul-Muhsen Hakkeer Trade and Industry Company
Advanced Systems Company
Al-Akmar Company for Communications
Al-Falak Electronic Devises and Equippments Company
Al-Jazeera Desert Trade Network (*Sahara Network*)[38]
Al-Jazeera Press, Media & Publishing Company
Al-Jeraisy Computer and Communication Services Company
Al-Masdar Saudi Systems Company
Al-Mawared Electronics Company
Al-Qasi International Contracting Company
Al-Rajihi Saudi Group
Al-Swaidi Trade and Contractions Company
Ammar Bakheet's Trading Establishment
Applied Computer Services Company
Arabian Advanced Systems Company (*Al-Naseej*)
Atlas Communications Company
Atta-Allah System Company
Commercial Investment and Development Company
Computer Engineering and Technology Establishment.
Computer Networking Contracting Company
Computer Systems Company
Computers and Systems Engineering Company
Connecting Information Systems Company/Branch of the Saudi Road Painting Company
Dar El-Qemam for Communications Company
Dallah Media Production Company
Digital Computer Systems Company
Electrical and Electronics Contracting Company
Electronic International Communications Company
Electronic Inventions Company
Farid Muhammed Zeydan's Bureau for Engineering Consultations
Future Technologies Company
Gulf Computers and Electronic Equipments Company
Gulf Network Saudi Company
Gulf Stars Computer Systems Company

[37] "List of ISPs Qualified…," *op. cit.*
[38] M.A.P., "Sahara Network Qualified ISP," *ArabiaTech*, 2 August 1998, <http://www.arabia.com/content/tech/8_98/sahara_2.8.98.shtml> (5 October 1998).

Haseb Trading Company (Applied Computer Services Company)
High Technology And Computer Systems Company
Horizon Information Systems and Communications
International Communication Company
The International Company for Advertisements and Publishing
International Computers Company
International Electronics Company
Jamal Al-Jasim Electronics Company
Jibal Advertisements and Publishing Company
Khaled Hasan Khattani and Partners Company
Khalil Ahmad Bin Laden Company
Modern Electronics Establishment
Muhamad Mansour Al-Rumeeh Trading Company
Muhammed Omar Esa'ee Electronics Company
Nader Holding Group Company
Nasir Sa'eed Al-Hajiri Computer Company
National Communication and Computer Group Company
The National Engineering Services and Marketing Company (NESMA)
National Information Systems Company
Nour Trading Company
Saleh Al-Nehdi Trading Establishments Group
Samir Photo Equipments Company
Satta Trading Company
Saudi Advavced Technology Agency
Saudi Arabic Computer Systems Company
Saudi Business Machines
Saudi Detcon Company
Saudi Fal Company
Saudi Information Technology Company
Saudi Ojeh Company
Saudi Voice Communications and Information Company
Shahir Technology Company
Silki La Silki Company (*SilkiNet*—The local operator for Kuwait-based ZakSat)[39]
Tamas Technology Company
The National Engineering Services and Marketing Company (NESMA)
United Development Company
United Enterprise for Maintenance and Operation

November 1998: 41 companies approved for ISP licenses[40]

[39] "Saudis near end of seven-year wait…," *op. cit.*; M.A.P., "Silki La Silki Accredited ISP," *ArabiaTech*, 5 August 1998, <http://www.arabia.com/content/tech/8_98/silki_5.8.98.shtml> (5 October 1998).
[40] "Internet Comes to Saudi," *op. cit.*

Abdul-Muhsen Hakkeer Trade and Industry Company
Al-Alamiah Electronics*
Al-Jazeera Desert Trade Network (*Sahara Network*)
Al-Jazeera Press, Media & Publishing Company
Al-Jeraisy Computer and Communication Services Company
Al-Qasi International Contracting Company
Al-Rajihi Saudi Group
Arabian Advanced Systems Company (*Al-Naseej*)
Arabian Circle Establishment*
Arabian Computer Systems*
Azieb Trading Company*
Commercial Invesment and Development Company
Connecting Information Systems Company/Branch of the Saudi Road Painting Company
Dallah Media Production Company
Digital Computer Systems Company
Global Advertising Company*
Gulf Network Saudi Company
Gulf Stars Computer Systems Company
Haseb Trading Company (Applied Computer Services Company)
Horizon Information Systems and Communications
Ibtikar Electronics Company*
International Computers Company
Jibal Advertisements and Publishing Company
Khalil Ahmad Bin Laden Company
Modern Electronics Establishment
Muhammed Omar Esa'ee Electronics Company
National Communication and Computer Group Company
The National Engineering Services and Marketing Company (NESMA)
National Information Systems Company
Nazir Holding Group*
Nour Trading Company
Samir Photo Equipments Company
Saudi Business Machines
Saudi Fal Company
Saudi Ojeh Company
Saudi Telecommunications Company (STC)*
Saudi Voice Communications and Information Company
Shahir Technology Company
Tamas Technology Company
United Development Company
United Enterprise for Maintenance and Operation

* Companies awarded licenses that did not appear on the list of pre-qualified companies.

Tab H **.SA ZONE DATA**

Domain	Nameserver	IP Address
com.sa		
com.sa.	ns1.isu.net.sa	212.26.18.3
com.sa.	ns1.kacst.edu.sa	198.77.88.3
com.sa.	ns.nixu.net	193.209.237.29
com.sa.	rip.psg.com	147.28.0.39
com.sa.	munnari.oz.au	128.250.1.21
com.sa.	ns.eu.net	192.16.202.11
aag	ns.nameservers.net	207.158.192.40
aag	ns2.nameservers.net	209.41.31.13
aag	ns3.nameservers.net	209.41.31.14
adtc	ns.nameservers.net	207.158.192.40
adtc	ns2.nameservers.net	209.41.31.13
adtc	ns3.nameservers.net	209.41.31.14
aec	ns1.interliant.com	198.64.193.25
aec	ns2.interliant.com	198.64.193.60
aha	dns1.american-data.net	204.69.248.194
aha	dns2.american-data.net	198.85.227.254
aject	dns1.american-data.net	204.69.248.194
aject	dns2.american-data.net	198.85.227.254
akte	ns.maindomain.com	209.41.115.6
akte	ns2.maindomain.com	209.41.115.7
alahli	asterix.instantaccess.com	195.92.136.3
alahli	ns1.instantaccess.com	195.92.136.2
al-ajlan	ns0.netbenefit.co.uk	212.53.64.30
al-ajlan	ns1.netbenefit.co.uk	212.53.77.30
albassam	ns0.netbenefit.co.uk	212.53.64.30
albassam	ns1.netbenefit.co.uk	212.53.77.30
al-bassam	ns1.paonline.com	198.69.90.250
al-bassam	ns2.paonline.com	198.69.90.11
al-bassam-shawl	ns0.netbenefit.co.uk	212.53.64.30
al-bassam-shawl	ns1.netbenefit.co.uk	212.53.77.30
al-emar	dns1.american-data.net	204.69.248.194
al-emar	dns2.american-data.net	198.85.227.254
alestudio	ns.nameservers.net	207.158.192.40
alestudio	ns2.nameservers.net	209.41.31.13
alestudio	ns3.nameservers.net	209.41.31.14
al-falak	noc.cerf.net	192.153.156.22
al-falak	ns1.oneglobe.net	199.107.176.2
alfayez	dns1.american-data.net	204.69.248.194
alfayez	dns2.american-data.net	198.85.227.254
alfozan	dns1.american-data.net	204.69.248.194
alfozan	dns2.american-data.net	198.85.227.254
algosaibi	dns1.american-data.net	204.69.248.194
algosaibi	dns2.american-data.net	198.85.227.254
aliaf	ns1.allinfosys.com	207.55.155.2
aliaf	ns2.allinfosys.com	209.44.59.2
alirezadelta	ns.nameservers.net	207.158.192.40
alirezadelta	ns2.nameservers.net	209.41.31.13
alirezadelta	ns3.nameservers.net	209.41.31.14

alirezaholidays	ns.nameservers.net	207.158.192.40
alirezaholidays	ns2.nameservers.net	209.41.31.13
alirezaholidays	ns3.nameservers.net	209.41.31.14
alirezaship	ns.nameservers.net	207.158.192.40
alirezaship	ns2.nameservers.net	209.41.31.13
alirezaship	ns3.nameservers.net	209.41.31.14
alirezatravel	ns.nameservers.net	207.158.192.40
alirezatravel	ns2.nameservers.net	209.41.31.13
alirezatravel	ns3.nameservers.net	209.41.31.14
al-khaleej	noc.cerf.net	192.153.156.22
al-khaleej	ns1.oneglobe.net	199.107.176.2
almanar	ns.nameservers.net	207.158.192.40
almanar	ns2.nameservers.net	209.41.31.13
almanar	ns3.nameservers.net	209.41.31.14
alnaghi	ns.nameservers.net	207.158.192.40
alnaghi	ns2.nameservers.net	209.41.31.13
alnaghi	ns3.nameservers.net	209.41.31.14
alnaghi-brothers	ns.nameservers.net	207.158.192.40
alnaghi-brothers	ns2.nameservers.net	209.41.31.13
alnaghi-international	ns.nameservers.net	207.158.192.40
alnaghi-international	ns2.nameservers.net	209.41.31.13
alnaghi-international	ns3.nameservers.net	209.41.31.14
alnaghi-jewellery	ns.nameservers.net	207.158.192.40
alnaghi-jewellery	ns2.nameservers.net	209.41.31.13
alnaghi-jewellery	ns3.nameservers.net	209.41.31.14
alowaidah	ns1.allinfosys.com	207.55.155.2
alowaidah	ns2.allinfosys.com	209.44.59.2
alqimam	ns1.kacst.edu.sa	198.77.88.3
alqimam	ns2.kacst.edu.sa	198.77.88.2
alrabie	dns1.american-data.net	204.69.248.194
alrabie	dns2.american-data.net	198.85.227.254
alrajhi	mail.shabakah.com	193.188.109.67
alrajhi	www.shabakah.com	193.188.109.6
al-rajhi	mail.shabakah.com	193.188.109.67
al-rajhi	www.shabakah.com	193.188.109.6
alrajhi-house	faith.mynet.net	208.162.200.4
alrajhi-house	jaguar.mynet.net	208.162.200.3
alrajhi-house	ns4.cw.net	204.70.49.234
alsaadeh	dns1.american-data.net	204.69.248.194
alsaadeh	dns2.american-data.net	198.85.227.254
alsalamaircraft	ns1.instantaccess.com	195.92.136.2
alsalamaircraft	ns3.instantaccess.com	194.130.168.245
alsulaiman	ns1.gpg.com	205.158.6.22
alsulaiman	ns1.simorgh.com	209.1.163.10
alswailem	ns1.allinfosys.com	207.55.155.2
alswailem	ns2.allinfosys.com	209.44.59.2
alwaseet	newdns.supernews.com	207.126.101.102
alwaseet	newdns2.supernews.com	207.126.101.83
alyaf	ns1.allinfosys.com	207.55.155.2
alyaf	ns2.allinfosys.com	209.44.59.2
alzahrani	ns.nameservers.net	207.158.192.40
alzahrani	ns2.nameservers.net	209.41.31.13
alzahrani	ns3.nameservers.net	209.41.31.14

anb	dns2.earthlink.net	207.217.77.12
anb	dns3.earthlink.net	207.217.120.13
apex	ns.nameservers.net	207.158.192.40
apex	ns2.nameservers.net	209.41.31.13
apex	ns3.nameservers.net	209.41.31.14
aquatek	dns1.american-data.net	204.69.248.194
aquatek	dns2.american-data.net	198.85.227.254
arabicmagazine	ns.web2010.com	209.235.31.149
arabicmagazine	ns2.web2010.com	209.196.60.253
aramco	nis.ans.net	147.225.1.2
aramco	ns.ans.net	192.103.63.100
artisana	faith.mynet.net	208.162.200.4
artisana	ns4.cw.net	204.70.49.234
ase	ns1.allinfosys.com	207.55.155.2
ase	ns2.allinfosys.com	209.44.59.2
asg-group	dn1.4biz.net	208.214.24.5
asg-group	dn2.4biz.net	208.214.24.10
basamh	faith.mynet.net	208.162.200.4
basamh	jaguar.mynet.net	208.162.200.3
brnamj	ns.web2010.com	209.235.31.149
brnamj	ns2.web2010.com	209.196.60.253
ccc	ns.nameservers.net	207.158.192.40
ccc	ns2.nameservers.net	209.41.31.13
ccc	ns3.nameservers.net	209.41.31.14
compulink	dns1.american-data.net	204.69.248.194
compulink	dns2.american-data.net	198.85.227.254
computerworks	ns.siteprotect.com	209.100.98.10
computerworks	ns2.siteprotect.com	209.224.144.2
desmal	dns1.american-data.net	204.69.248.194
desmal	dns2.american-data.net	198.85.227.254
eae	gold.eae.com.sa	198.77.102.185
eajb	david.siemens.com.sg	203.127.206.11
eajb	david.siemens.de	192.35.17.1
eajb	ns.sbs.de	194.112.84.17
elkhereiji	faith.mynet.net	208.162.200.4
elkhereiji	jaguar.mynet.net	208.162.200.3
energico	ns0.ns0.com	209.197.64.1
energico	ns89.pair.com	209.68.1.187
ericsson	dns.primaerdata.no	195.1.90.3
ericsson	ylle.numera.se	195.100.61.2
ewe	dns1.american-data.net	204.69.248.194
ewe	dns2.american-data.net	198.85.227.254
gac	dns1.american-data.net	204.69.248.194
gac	dns2.american-data.net	198.85.227.254
gns	ns1.azc.com	205.185.165.4
gns	phoenix.azc.com	205.185.165.2
goldenpalm	ns.nameservers.net	207.158.192.40
goldenpalm	ns2.nameservers.net	209.41.31.13
goldenpalm	ns3.nameservers.net	209.41.31.14
gulfnet	ns1.azc.com	205.185.165.4
gulfnet	phoenix.azc.com	205.185.165.2
haaco	ns.nameservers.net	207.158.192.40
haaco	ns2.nameservers.net	209.41.31.13

haaco	ns3.nameservers.net	209.41.31.14
hasib	faith.mynet.net	208.162.200.4
hasib	ns4.mci.net	204.70.49.234
hempel	dns.primarydata.no	195.1.90.3
hempel	ylle.numera.se	195.100.61.2
hha	ns.nameservers.net	207.158.192.40
hha	ns2.nameservers.net	209.41.31.13
hha	ns3.nameservers.net	209.41.31.14
homecenter	dn1.4biz.net	208.214.24.5
homecenter	dn2.4biz.net	208.214.24.10
horizons	faith.mynet.net	208.162.200.4
horizons	ns4.mci.net	204.70.49.234
houseofdonuts	faith.mynet.net	208.162.200.4
houseofdonuts	jaguar.mynet.net	208.162.200.3
ics	ns.gcc.com.bh	193.188.104.2
ics	ns2.gcc.com.bh	
ikea	ns1.webservices.net	194.106.36.1
ikea	ns2.webservices.net	194.72.236.3
jabria	ns0.ns0.com	209.197.64.1
jabria	ns87.pair.com	209.68.1.183
jccs	sv6.batelco.com.bh	193.188.97.212
jccs	sv7.batelco.com.bh	193.188.97.197
jeraisy	sv6.batelco.com.bh	193.188.97.212
jeraisy	sv7.batelco.com.bh	193.188.97.197
kacs	dns1.american-data.net	204.69.248.194
kacs	dns2.american-data.net	198.85.227.254
karam-asg	dn1.4biz.net	208.214.24.5
karam-asg	dn2.4biz.net	208.214.24.10
kia	ns.nameservers.net	207.158.192.40
kia	ns2.nameservers.net	209.41.31.13
kia	ns3.nameservers.net	209.41.31.14
lana	faith.mynet.net	208.162.200.4
lana	jaguar.mynet.net	208.162.200.3
lappet	ns0.netbenefit.co.uk	212.53.64.30
lappet	ns1.netbenefit.co.uk	212.53.77.30
legrand	polaris.gsi.fr	150.175.128.2
legrand	relay1.fnet.fr	192.134.192.129
marmo-tech	dn1.4biz.net	208.214.24.5
marmo-tech	dn2.4biz.net	208.214.24.10
mazda	ns.nameservers.net	207.158.192.40
mazda	ns2.nameservers.net	209.41.31.13
mazda	ns3.nameservers.net	209.41.31.14
mcdf	ns0.ns0.com	209.197.64.1
mcdf	ns87.pair.com	209.68.1.183
medco	ns1.powerhost.co.uk	209.207.141.81
medco	ns2.powerhost.co.uk	207.153.246.211
mel	relay.orbit.net	194.177.108.200
mel	venere.inet.it	194.20.8.4
		194.185.132.253
mercury	ns.nameservers.net	207.158.192.40
mercury	ns2.nameservers.net	209.41.31.13
mercury	ns3.nameservers.net	209.41.31.14
mpt	faith.mynet.net	208.162.200.4

mpt	jaguar.mynet.net	208.162.200.3
mpt	ns4.cw.net	204.70.49.234
m-s-al-ajlan-sons	ns0.netbenefit.co.uk	212.53.64.30
m-s-al-ajlan-sons	ns1.netbenefit.co.uk	212.53.77.30
mso	ns1.allinfosys.com	207.55.155.2
mso	ns2.allinfosys.com	209.44.59.2
naseej	ns1.naseej.com.sa	212.26.50.35
naseej	ns2.naseej.com.sa	212.26.50.39
natcom	ns.nameservers.net	207.158.192.40
natcom	ns2.nameservers.net	209.41.31.13
natcom	ns3.nameservers.net	209.41.31.14
ncci	ns1.sitehosting.net	208.232.92.2
ncci	ns3.sitehosting.net	208.227.179.3
nic	ns5.netcomi.com	204.58.155.20
nic	ns6.netcomi.com	204.58.155.21
nixu	ns.nixu.com.sa	193.209.237.29
nixu	ns1.isu.net.sa	212.26.18.3
nour	engine1.firstnet.com.jo	212.35.64.254
nour	engine5.first.net.jo	
pamatec	ns0.ns0.com	209.197.64.1
pamatec	ns59.pair.com	209.68.1.127
prosco	ns0.ns0.com	209.197.64.1
prosco	ns89.pair.com	209.68.1.187
rabie	dns1.american-data.net	204.69.248.194
rabie	dns2.american-data.net	198.85.227.254
riyadbank	ns1.arab.net	194.73.200.1
riyadbank	ns2.arab.net	194.73.200.2
riyadhweb	ns.web2010.com	209.235.31.149
riyadhweb	ns2.web2010.com	209.196.60.253
rolls-royce	dns0.link96.com	194.164.30.12
rolls-royce	dns1.link96.com	194.164.30.10
saadeddin	dn1.4biz.net	208.214.24.5
saadeddin	dn2.4biz.net	208.214.24.10
sahara	dns1.bahrain.com	193.188.106.2
sahara	dns2.bahrain.com	193.188.106.3
sakia	faith.mynet.net	208.162.200.4
sakia	jaguar.mynet.net	208.162.200.3
saudifal	ns.nameservers.net	207.158.192.40
saudifal	ns2.nameservers.net	209.41.31.13
saudifal	ns3.nameservers.net	209.41.31.14
saudinfo	ns1.kacst.edu.sa	198.77.88.3
saudinfo	ns2.kacst.edu.sa	198.77.88.2
saudionline	dns1.american-data.net	204.69.248.194
saudionline	dns2.american-data.net	198.85.227.254
saudioracle	ns1.oracle.co.uk	194.73.152.5
saudioracle	ns2.oracle.co.uk	193.130.129.194
sbm	ns.de.ibm.net	152.158.2.48
sbm	ns.uk.ibm.net	152.158.16.48
scec	ns.nameservers.net	207.158.192.40
scec	ns2.nameservers.net	209.41.31.13
scec	ns3.nameservers.net	209.41.31.14
sceco-c	ns1.nameserve.net	207.159.128.3
sceco-c	ns2.nameserve.net	207.159.128.11

sceco-c	ns3.nameserve.net	207.159.153.115
sceco-east	dns1.american-data.net	204.69.248.194
sceco-east	dns2.american-data.net	198.85.227.254
shemagh-al-bassam	ns0.netbenefit.co.uk	212.53.64.30
shemagh-al-bassam	ns1.netbenefit.co.uk	212.53.77.30
shields	ns1.secure.net	192.41.1.10
shields	ns2.secure.net	192.41.2.10
siemens	david.siemens.com.sg	203.127.206.11
siemens	david.siemens.de	192.35.17.1
silkilasilki	ns1.gpg.com	205.158.6.22
silkilasilki	ns1.simorgh.com	209.1.163.10
sis	ns1.secure.net	192.41.1.10
sis	ns2.secure.net	192.41.2.10
spimaco	ns.nameservers.net	207.158.192.40
spimaco	ns2.nameservers.net	209.41.31.13
spimaco	ns3.nameservers.net	209.41.31.14
sraco	dns1.american-data.net	204.69.248.194
sraco	dns2.american-data.net	198.85.227.254
ssoc-asg	dn1.4biz.net	208.214.24.5
ssoc-asg	dn2.4biz.net	208.214.24.10
stc	ns1.sa.medu.net	206.241.58.240
		206.241.58.120
stc	ns1stc.sa.medu.net	212.26.19.252
surfnet	ags.ga.erg.sri.com	192.26.244.1
surfnet	ags-fs2.ga.erg.sri.com	192.26.244.140
tughrastamps	ns.siteprotect.com	209.100.98.10
tughrastamps	ns2.siteprotect.com	209.224.144.2
uam	dn1.4biz.net	208.214.24.5
uam	dn2.4biz.net	208.214.24.10
united-arab-motors	dn1.4biz.net	208.214.24.5
united-arab-motors	dn2.4biz.net	208.214.24.10
wescosa	dn1.4biz.net	208.214.24.5
wescosa	dn2.4biz.net	208.214.24.10
xml-asg	dn1.4biz.net	208.214.24.5
xml-asg	dn2.4biz.net	208.214.24.10
ygosaibi	dns1.american-data.net	204.69.248.194
ygosaibi	dns2.american-data.net	198.85.227.254
zahrani	ns.nameservers.net	207.158.192.40
zahrani	ns2.nameservers.net	209.41.31.13
zahrani	ns3.nameservers.net	209.41.31.14
zajil	faith.mynet.net	208.162.200.4
zajil	ns4.mci.net	204.70.49.234
zamilglass	dns1.american-data.net	204.69.248.194
zamilglass	dns2.american-data.net	198.85.227.254
zedan	ns0.demon.co.uk	158.152.1.65
zedan	ns1.demon.co.uk	158.152.1.193
zedan	ns2.demon.net	207.69.194.186
zedan-consultants	dns1.american-data.net	204.69.248.194
zedan-consultants	dns2.american-data.net	198.85.227.254

edu.sa

edu.sa.	ns1.kacst.EDU.sa	198.77.88.3
edu.sa.	ns.nixu.net	193.209.237.29

edu.sa.	rip.psg.com	147.28.0.39
edu.sa.	munnari.oz.au	128.250.1.21
edu.sa.	ns.eu.net	192.16.202.11
edu.sa.	ns1.isu.net.sa	212.26.18.3
ipa	ns1.ipa	198.77.102.58
kaau	ns1.kaau	198.77.102.44
kaau	kaaugw.kaau	198.77.102.41
kacst	ns1.kacst.edu.sa	198.77.88.3
kacst	ns2.kacst.edu.sa	198.77.88.2
kacst	rip.psg.com	147.28.0.39
kfshrc	chic.kfshrc.EDU.sa	199.75.90.33
kfshrc	imedl.saudi.net	199.75.86.30
kfshrc	kfshhub.kfshrc.EDU.sa	199.75.90.34
kfu	ns1.kfu	198.77.102.37
kfupm	ns1.kfupm	198.77.102.26
kfupm	ns2.kfupm	198.77.102.27
ksu	ns1.ksu	198.77.102.18
ksu	ns2.ksu	198.77.102.20
uqu	ns1.uqu	198.77.102.50
gov.sa		
gov.sa.	ns1.kacst.edu.sa	198.77.88.3
gov.sa.	ns.nixu.net	193.209.237.29
gov.sa.	rip.psg.com	147.28.0.39
gov.sa.	munnari.oz.au	128.250.1.21
gov.sa.	ns.eu.net	192.16.202.11
gov.sa.	ns1.isu.net.sa	212.26.18.3
makkah	dns0.amxstudios.com	195.238.161.131
makkah	dns0.sonnet.co.uk	195.238.160.225
moc	ns1.naseej.net	212.26.50.35
moc	ns2.naseej.net	212.26.50.39
mohe	ns.mohe.gov.sa	198.77.102.138
mohe	ns1.mohe.gov.sa	198.77.102.137
moia	faith.mynet.net	208.162.200.4
moia	jaguar.mynet.net	208.162.200.3
moia	ns4.cw.net	204.70.49.234
sama	ns1.homepage.net	195.224.109.2
sama	ns2.homepage.net	194.216.216.193
samofa	ns0.bt.net	194.72.6.51
samofa	ns1.bt.net	194.72.6.52
med.sa		
med.sa.	ns1.isu.net.sa	212.26.18.3
med.sa.	ns1.kacst.edu.sa	198.77.88.3
med.sa.	ns.nixu.net	193.209.237.29
med.sa.	munnari.oz.au	128.250.1.21
med.sa.	ns.eu.net	192.16.202.11
net.sa		
net.sa.	ns1.isu.net.sa	212.26.18.3
net.sa.	ns1.kacst.edu.sa	198.77.88.3
net.sa.	ns.nixu.net	193.209.237.29
net.sa.	rip.psg.com	147.28.0.39

net.sa.	munnari.oz.au	128.250.1.21
net.sa.	ns.eu.net	192.16.202.11
arab	netra1.arab.net	194.73.200.1
arab	netra2.arab.net	194.73.200.2
internic	ns1.isu.net.sa	212.26.18.3
internic	ns1.kacst.edu.sa	198.77.88.3
isu	ns1.isu.net.sa	212.26.18.3
isu	ns1.kacst.edu.sa	198.77.88.3
nesma	ns1.nesma.net.sa	212.26.53.10
nesma	ns2.nesma.net.sa	212.26.53.11
nour	NS1.ISU.net.sa	212.26.18.3
nour	ns1.nour.net.sa	212.26.46.2
nour	ns2.nour.net.sa	212.26.46.3
ogertel	cordoba.cyberia.net.lb	207.240.177.153
ogertel	nse1.cyberia.net.lb	195.112.195.53
prime	ns1.allinfosys.com	207.55.155.2
prime	ns2.allinfosys.com	209.44.59.2
saudinic	ns1.isu.net.sa	212.26.18.3
saudinic	ns1.kacst.edu.sa	198.77.88.3
shabakah	mail.shabakah.com	193.188.109.67
shabakah	www.shabakah.com	193.188.109.68
shaheer	ns1.sitehosting.net	208.232.92.2
shaheer	ns3.sitehosting.net	208.227.179.3
sol	ns1.bestlink.com	192.41.1.109
sol	ns2.bestlink.com	192.41.2.109

org.sa

org.sa.	munnari.oz.au	128.250.1.21
org.sa.	ns.eu.net	192.16.202.11
org.sa.	ns.nixu.net	193.209.237.29
org.sa.	ns1.isu.net.sa	212.26.18.3
org.sa.	ns1.kacst.edu.sa	198.77.88.3
org.sa.	rip.psg.com	147.28.0.39
gsmo	faith.mynet.net	208.162.200.4
gsmo	ns4.mci.net	204.70.49.234
islam	faith.mynet.net	208.162.200.4
islam	jaguar.mynet.net	208.162.200.3
islam	ns4.cw.net	204.70.49.234
pma	ns.nameservers.net	207.158.192.40
pma	ns2.nameservers.net	209.41.31.13
quran	faith.mynet.net	208.162.200.4
quran	jaguar.mynet.net	208.162.200.3
quran	ns4.cw.net	204.70.49.234
saso	faith.mynet.net	208.162.200.4
saso	ns4.mci.net	204.70.49.234
scs	dns1scs.sa.medu.net	206.241.58.79
scs	kfshhub.kfshrc.edu.sa	199.75.90.34
scs	ns1.sa.medu.net	206.241.58.240
		206.241.58.120

sch.sa

sch.sa.	ns1.kacst.edu.sa	198.77.88.3
sch.sa.	ns.nixu.net	193.209.237.29

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sch.sa.                 munnari.oz.au                   128.250.1.21
sch.sa.                 ns.eu.net                       192.16.202.11
sch.sa.                 ns1.isu.net.sa                  212.26.18.3
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Tab I **SAUDI INTRANETS**

AAS-1	212.26.48.0	- 212.26.52.255	Arabian Advanced Systems, Riyadh (*Al-Naseej*)
ACSC-1	212.26.66.0	- 212.26.66.255	Arabic Computer System Co., Riyadh
ALALAMIAH-1	212.26.67.0	- 212.26.67.255	Al-Alamiah Networks, Riyadh
ALJAZIRAH-1	212.26.64.0	- 212.26.65.255	Al-Jazirah Corporation, Press Printing & Publishing, Riyadh
ATHEEB-1	212.26.58.0	- 212.26.59.255	Atheeb Trading Co. Ltd., Riyadh
AWALNET-1	212.26.75.0	- 212.26.75.255	Al-Faisalia Group, Riyadh
CIDC-1	212.26.62.0	- 212.26.62.255	Commercial Investment and Development Co., Dhahran
DALLH-1	212.26.60.0	- 212.26.61.255	Dallah Media Production, Jeddah
EAE-1	212.26.36.0	- 212.26.39.255	EAE, Riyadh
EC-1	212.26.74.0	- 212.26.74.255	Electronic Concepts Co., Riyadh
GULFNET-1	212.26.73.0	- 212.26.73.255	GulfNet - Zajil ISP, Riyadh
ICC-1	212.26.68.0	- 212.26.68.255	International Computer Company Ltd., Jeddah
ISDB-1	212.26.32.0	- 212.26.35.255	Islamic Development Bank, Jeddah
ISU-1	212.26.18.0	- 212.26.18.255	Internet Service Unit, KACST
ISU-2	212.26.19.0	- 212.26.19.255	Internet Service Unit, KACST
ISU-3	212.26.63.0	- 212.26.63.255	Internet Service Unit, KACST
JERAISY-1	212.26.72.0	- 212.26.72.255	Jeraisy Group, Riyadh
KACST-1	212.26.40.0	- 212.26.45.255	King Abdulaziz City for Science and Technology, Riyadh
KFSH-1	195.128.0.0	- 195.128.16.255	King Faisal Specialist Hospital and Research Centre, Riyadh
KFU-1	212.26.20.0	- 212.26.31.255	King Faisal University, Hofuf
KFUPM-1	212.26.0.0	- 212.26.4.255	King Fahd University for Petroleum and Minerals, Dhahran
MEDUNET-1	212.26.69.0	- 212.26.69.255	Sultan Bin Abdulaziz Foundation Program for Medical and Educational, Riyadh
MOHE-1	212.26.5.0	- 212.26.5.255	Ministry of Higher Education, Riyadh
NESMA-1	212.26.53.0	- 212.26.55.255	National Engineering Services and Marketing Company, Riyadh
NOURNET-1	212.26.46.0	- 212.26.47.255	Nour Trading Co. Ltd., Riyadh
SA-KACST-980615	212.26.0.0	- 212.26.127.255	Saudi Network Information and Operations Center, Riyadh
SAMIR-1	212.26.56.0	- 212.26.57.255	Samir Photographic Supplies Co. Ltd., Jeddah
SAUDI-COL	198.77.88.0	- 198.77.103.255	Washington Coordinating Center
SAUDIOGER-1	212.26.71.0	- 212.26.71.255	Saudi Oger Ltd., Riyadh
SFH-1	212.26.6.0	- 212.26.11.255	Security Forces Hospital, Riyadh
SHABAKAH-1	212.26.70.0	- 212.26.70.255	Al-Rajhi Saudi Group (*Al-Shabakah*), Riyadh
UQU-1	212.26.12.0	- 212.26.17.255	Ummul Qura University, Makkah

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USUSP-MO-MD-US  199.75.86.0  - 199.75.95.255   Washington Coordination Center-
                                               US Universitites/Saudi Project
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