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**Saudi Arabia Enters the 21st Century:
The Military and Internal Security Dimension**

VIII. The Saudi Air Defense Force

Final Review

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Introduction

This analysis is being circulated for comment as part of the CSIS “Saudi Arabia Enters the 21st Century Project.” It will be extensively revised before final publication.

Those interested in commenting, or in participating in the project, should contact Anthony H. Cordesman at the address shown on the cover sheet at Acordesman@aol.com.

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The CSIS “Saudi Arabia Enters the 21st Century Project”

The CSIS is undertaking a new project to examine the trends shaping the future of Saudi Arabia and its impact on the stability of the Gulf. This project is supported by the Smith Richardson Foundation and builds on the work done for the CSIS Strategic Energy Initiative, the CSIS Net Assessment of the Middle East, and the Gulf in Transition Project. It is being conducted in conjunction with a separate – but closely related – study called the Middle East Energy and Security Project.

The project is being conducted by Anthony H. Cordesman, the Arleigh A. Burke Chair in Strategy. It uses a net assessment approach that looks at all of the major factors affecting Saudi Arabia’s strategic, political, economic, and military position and future implications of current trends. It is examining the internal stability and security of Saudi Arabia, social and demographic trends, and the problem of Islamic extremism. It also examines the changes taking place in the Saudi economy and petroleum industries, the problems of Saudisation, changes in export and trade patterns, and Saudi Arabia’s new emphasis on foreign investment.

The assessment of Saudi Arabia’s strategic position includes a full-scale analysis of Saudi military forces, defense expenditures, arms imports, military modernization, readiness, and war fighting capability. It also, however, looks beyond the military dimension and a narrowly definition of political stability, and examine the implications of the shifts in the pattern of Gulf, changes in Saudi external relations such changes in Saudi policy towards Iran and Iraq. It examines the cooperation and tensions between Saudi Arabia and the other Southern Gulf states. It examines the implications of the conventional military build-up and creeping proliferation of weapons of mass destruction in the Gulf, the resulting changes in Saudi Arabia’s security position. It also examines the security and strategic implications of the steady expansion of Saudi Arabia’s oil, gas, and petrochemical exports.

This project is examining the succession in the Royal Family, the immediate political probabilities, and the generational changes that are occurring in the royal family and Saudi Arabia’s technocrats. At the same time, it examines the future political, economic, and social trends in Saudi Arabia, and possible strategic futures for Saudi Arabia through the year 2010.

This examination of the strategic future of Saudi Arabia includes Saudi Arabia’s possible evolution in the face of different internal and external factors -- including changes in foreign and trade policies towards Saudi Arabia by the West, Japan, and the Gulf states. Key issues affecting Saudi Arabia’s future, including its economic development, relations with other states in the region, energy production and policies, and security relations with other states will be examined as well.

A central focus of this project is to examine the implications of change within Saudi Arabia, their probable mid and long-term impacts, and the most likely changes in the nature or behavior of

Saudi Arabia's current ruling elite, and to project the possible implications for both Gulf stability and the US position in the Gulf.

Work on the project will focus on the steady development of working documents that will be revised steadily during the coming months on the basis on outside comment. As a result, all of the material provided in this section of the CSIS web page should be regarded as working material that will change according to the comments received from policymakers and outside experts. To comment, provide suggestions, or provide corrections, please contact Anthony H. Cordesman at the CSIS at the address shown on each report, or e-mail him at Acordesman@aol.com.

Related material can be found in the "Gulf and Transition" and " Middle East Energy and Security" sections of the CSIS Web Page at CSIS.ORG.

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VIII. The Saudi Air Defense Force

The Saudi Air Force has significant air defense capabilities, and the Saudi Army has growing mobile air defenses to protect its forces. Saudi Arabia also has a separate Saudi Air Defense Corps to provide fixed and mobile land-based air defense of key targets throughout Saudi Arabia. This force was created in 1984 to establish a separate professional service, dedicated to the relatively high technology air defense mission, and to reduce the manpower quality and leadership problems that emerged when these air defense forces were subordinated to the army.

The Air Defense Corps manages the use of the Saudi and Saudi and US Patriot missile defenses as well as Saudi Arabia's PRC-supplied CSS-2 surface-to-surface missiles. It is subordinate to the Air Force for C⁴I and battle management in time of war, but would play a critical role in any air battle and provides Saudi Arabia's only theater missile defense capabilities.¹

The Current Strength of Saudi Land-Based Air Defense Forces

A broad comparison of Saudi and other Gulf land-based air defense strength is shown in Table 8.1. Detailed estimates of the current strength and equipment of the Air Defense Force differ according to which specific surface-based air defense units are included in the total, and which forces are counted as being in the ADF versus the Air Force, Navy, and Army. It is clear that the Saudi Air Defense Force controls all of Saudi Arabia's Improved Hawk missiles, and most of its medium surface-to-air missiles, but its exact lines of control are unclear. Some sources indicate that the Air Defense force controls all mobile and crew-powered weapons, and that the Army controls all man-portable Mistral, Stinger, and Redeye teams. Other sources indicate the Army also controls Saudi Arabia's Crotale missiles. Control of given deployments of anti-aircraft guns is also unclear.

The Saudi Air Defense Force was reported to have a nominal strength of 16,000 men in 2002, and some 33-48 surface-to-air missile batteries. However, some sources indicate Saudi

Arabia's total air defense manning was substantially smaller. Sources also differ over the equipment of these forces:²

- Some reports indicated its total major surface-to-air missile strength included 16 Improved Hawk batteries with 128 fixed and mobile fire units, 9 Crotale batteries with 48 Crotale fire units (currently being modernized), 16 air defense batteries with 72 Shahine fire units, and 50 AMX-30SA 30 mm self-propelled guns.
- In late 2001, the IISS reported a strength 16 Improved Hawk batteries with 128 fire units, 17 air defense batteries with 68 Shahine fire units and AMX-30SA 30 mm self-propelled guns, and 73 Crotale and Shahine fire units in static positions. It reported a total inventory of 50 AMX-30 SAs, 141 Shahine launchers, and 40 Crotale launchers. It also reported 92 M-163 20mm Vulcan anti-aircraft guns and 50 AMX-30SA anti-aircraft guns, plus 70 L/70 40mm anti-aircraft guns in storage.
- USCENTCOM reported a total of 33 SAM batteries and 73 Crotale and Shahine fire units.
- Periscope reported in early 2002 that the Air Defense force has 33 air defense batteries, with 16 Hawk and 17 Shahine batteries. It reported a weapons strength of 8 MIM-104 Patriot launchers with 1,061 rounds (which seems far too high), 128 mobile and fixed MIM-23B IHawk fire units, four truck mounted Otomat coastal defense batteries, and 141 Shahine fixed and mobile launchers with 60 Shahine II AMX-30-mounted launchers. It also reported holdings of 118 35mm GDF 005 twin anti-aircraft guns plus 128 40mm L/70 anti-aircraft guns in storage.³

Saudi Arabia is building up a force of 5-6 Patriot PAC-2 battalions, and 2-4 have now become active with a good history of live fire activity dating back to 2000. Unlike many Saudi forces they have also conducted meaningful mobility exercises—including movement from Damman to King Khalid Military City near Wafr al-Batin. Each battalion has three batteries, and the Saudi units benefit from both good contractor support and contact with the US Patriot battery in the Kingdom. The PAC-2 is an excellent air and cruise missile defense system, and can provide effective point defense against Scud and similar missile warheads over a limited area.

Most of Saudi Arabia's Shahine units are deployed in fixed locations for the defense of air bases and key targets. All of the Shahine systems were being upgraded as the result of an agreement with France signed in 1991. These units provide close-in defense capability for virtually all of Saudi Arabia's major cities, ports, oil facilities, and military bases.

Total Saudi Army holdings of man-portable surface-to-air missiles include 500-700 Mistrals, 350-400 Stingers, and 500-600 Redeyes. The number and type of anti-aircraft guns currently operational is uncertain. Some reports state it has 35 35mm Oerlikon-Contraves twin AA guns with Skyguard fire control systems, 72 40mm L-70 AA guns, 53 30mm AMX-30 DCA

twin anti-aircraft guns, and an unknown number of 20mm Vulcan M163 guns. Other reports indicate it had had 92 M-163 Vulcan 20 mm anti-aircraft guns, 30 V-150s with Vulcan 20 mm guns, 30 towed 20 mm Vulcans, 128 35 mm AA guns, and 150 L/70 40 mm guns (most in storage).⁴ These reports may mix the holdings of the Army and Air Defense Force.

Unclassified reports on the future build-up of a Saudi Patriot force are unclear. According to some reports, Saudi Arabia signed letters of agreement to purchase its first Patriot units on September 27, 1990, as part of its Gulf War arms package. Saudi Arabia signed a \$1.03 billion contract for the first part of this force in December 1992. This contract included 13 launchers, 671 missiles, and associated equipment. It then bought 14 more Patriot fire units (with 64 Patriot long-range air defense missiles, 1 AN/MPQ-53 radar sets, 1 engagement control station, and 8 launcher stations each) to defend its sites, military bases, and major oil facilities.⁵ Delivery of the first eight batteries, including two training batteries, began in 1993. Saudi Arabia signed a \$580 million support contract for its new Patriots and its existing IHawks with Raytheon in March 1993.⁶

According to a report in the mid-1990s, Saudi Arabia's goal was to acquire 384 Patriot long-range air defense missiles, six AN/MPQ-53 radar sets, six engagement control stations, and 48 launcher stations. Another interview indicated that Saudi and US Army studies showed that Saudi Arabia might eventually require a total of 26 launcher stations – depending on the level of anti-tactical ballistic missile capability and anti-aircraft coverage desired. These same studies indicated Saudi Arabia was already committed to spend some \$2.2 billion out of a total cost of \$4.0 billion for the 20-26 batteries it would need.⁷

Reports differ of whether Saudi Arabia had two or three major operational Patriot fire units in early 2002, and there was one report it had a fourth. The US deployed a Patriot battery near Riyadh in 2002, and some reports indicate equipment was prepositioned for two battalions although other sources indicate this a rapid deployment capability. Another source cites only 8 active MIM-104 fire units. There seems to be agreement that operational readiness is growing. Live fire exercises began in the fall of 2000, and mobile operations have taken years to develop. The first mobile deployment approaching a combat exercise was a road march from Dhahran to a site near King Khalid Military City in the fall of 2000.

US experts indicated in early 2001 that they felt the Kingdom need three to four major concentrations of Patriots to cover its major oil ports, Riyadh, and cities in the east and west. They noted, however, that no detailed assessment had been made of future requirements for Saudi anti-theater ballistic missile requirements and no detailed current plan existed for sizing an overall surface-to-air missile and ATBM force.

Regardless of what the Kingdom eventually does, Saudi and US Patriot units have already improved Saudi Arabia's low to high-level air defense capability and provided some defense against medium-range and theater ballistic missiles. The units Saudi Arabia has bought have improved software, radar processing capabilities, longer-range missiles, better guidance systems, and more lethal warheads. Unlike the Patriots used during the Gulf War, they are designed to kill short- to medium-range ballistic missiles at comparatively long ranges and to discriminate between warheads and decoys and parts of the missile body.

Improving Saudi Air Defense Battle Management

The Saudi Air Defense Force has many of the same readiness, joint warfare, training, and funding problems as the other services. As might be expected, some are matters of readiness, manpower quality, and training. Others are problems in command and control and battle management. The Saudi Air Defense Force still lacks the systems integration, battle management systems, and C⁴I software and integration it needs for effective operation. Moreover, contractor efforts to improve the integration of the Saudi Air Defense Corps' Improved Hawks, Shahines (Improved Crotale), anti-aircraft guns, and land-based radars and C⁴I systems have not been fully effective, and the Saudi air defense system is not easy to restructure.

The Saudi Arabian air defense network was first developed in the 1960s and used US and British radars. Saudi Arabia then added a number of bits and pieces over the years. It bought a Thomson CSF air command and control system, and four Westinghouse AN/TPS-43 three-dimensional radars in 1980. It ordered AN/TPS-43G radars to modernize its system as part of the Peace Pulse program in 1981, and updated its system to provide command and data links to its E-3A AWACS.⁸

Although these systems did improve Saudi capabilities in some ways, Saudi Arabia still was left with major communications and C⁴I integration problems, which it attempted to solve by giving new contracts to Litton and Boeing.⁹ The Litton contract involved a \$1.7 billion effort to provide C⁴I, sensors, communications systems, and handle the interface between missiles and other air defense systems, as well as build sites and train personnel. Key elements involved 17 major communications links installed in S-280C militarized transportable shelters, and included both line-of-sight and tropospheric scatter links of 72-channel capacity. The field phase involved 34 low-level and 34 high-level shelters. While there is some dispute as to responsibility, the system was not fully operational when the contract was due to be completed. Even today some parts of the Litton supplied system seem to be experiencing problems, some of which may be the result of a lack of trained Saudi personnel.¹⁰

Saudi Arabia purchased another integrated C⁴I/BM subsystem in March 1989, called Falcon Eye. This is a tactical radar system that involves the supply of Westinghouse AN/TPS-70 radars with related computers, software, communications systems, and systems integration. Falcon Eye integrates data from ground radars and the E-3A force, and down-link data to the 14 Skyguard/Gun King batteries in the Saudi Air Defense Force that are used for close-in defense of air bases and vital military installations. It is supposed to be compatible with Peace Pulse and Peace Shield. The system began to become fully operational in 1992.

The "Peace Shield" Project

The Boeing contract, which was called the "Peace Shield" project, had a total cost of \$5.6 billion. It involved a far more ambitious effort to give Saudi Arabia a system of 17 AN/FPS-117(V)3 long-range, three-dimensional radar systems fully netted with its AN-TPS-43 and AN-TPS-72 short and medium-range radars. It was to have (a) a central command operations center (COC) at Riyadh, (b) five sector command centers (SCCs) at Dhahran, Taif, Tabuk, Khamis Mushayt, and Al-Kharj to cover the country, and (c) additional sector operations centers (SOCs) at each major air base. It was to use a tropospheric scattering and microwave communications system to integrate Saudi Arabia's surface-to-air missile defenses, some anti-aircraft gun units, its radars, its E-3A airborne warning and control systems (AWACS) aircraft and fighters, and six

major regional underground operating centers and numerous smaller sites, all of which were to be managed by a command center in Riyadh.

This system was supposed to give Saudi Arabia the ability to provide battle management for high-intensity air combat and beyond-visual-range combat, and in providing the base for a system to integrate the six Southern Gulf countries in the GCC: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE. However, the software and systems integration efforts required to make Peace Shield effective were years behind schedule at the time of the Gulf War. The US Air Force found the performance of the contractor to be so bad that the US Air Force Electronic Systems Division issued a “show cause notice” and then terminated Boeing's work on the program in January 1991.

The situation was so bad that several senior US advisors in Saudi Arabia regarded the combined failure of Boeing and the US Air Force to deliver a useful Peace Shield program as the worst managed single arms sale in the history of the Gulf. One senior US officer described it as, “ a disaster on the part of the contractor and the Air Force from start to finish...A model of what should never happen.” Boeing staff, in turn, blamed the US Air Force for problems in the contract specifications, program changes, and inadequate management.

In any case, Saudi Arabia had to begin again with a new contractor. It shifted the contract from Boeing to Hughes in July 1991, at a cost of \$837 million, and this time the program made solid progress.¹¹ The new Peace Shield system began to become operational in January 1995, and performed well in the Flag of Glory exercises that Saudi Arabia held in January 1996. The Peace Shield system uses Hughes AMD-44 workstations, Hughes HDP-6200 large screen displays, a modern data processing architecture, and far more advanced software. It will have some 300 individual sites and integrate a mix of Saudi radars that now includes 28 AN/TPS-43s, 17 AN/FPS-117s, and 35 AN/TPS-63s. The core of the system consists of the 17 AN/FPS-117s, with three each under the control of centers at Khamis, Al Kharj, Dhahran, and Taif, and five under the control of Tabuk in the northwest. The system made extensive use of modern optical fiber technology, although no provision was made for advanced data links to neighboring states like Bahrain and Kuwait.

Peace Shield finally became fully operational in 1996, some three years after the original target date of 1993. Like all of Saudi Arabia's more sophisticated air systems, it remains heavily dependent on US technical assistance and the Saudi Air Defense Force will need assistance in operating the system until well after the year 2010.¹² Saudi Arabia did purchase the support necessary to make its system effective as part of the \$2.5 billion contract for contractor and maintenance services discussed earlier. It also purchased \$484 million worth of support and training services for its Patriots and IHawk units from Raytheon in May 1997. This contract runs through December 1999.¹³ Funding, however, has been uncertain since the "oil crash" of 1998.

The future of Saudi funding for the Peace Shield and Peace Sun projects was called into question in May 1999. Saudi Arabia had missed an FMS payment in March and the United States considered not renewing the project. Saudi Arabia and the United States had to look for options to justify the renewal of the contract, including the assumption of loans by private contractors involved in the project to cover a deferral of Saudi payments. The Saudi government would then repay the loan with interest at a later date. Although a payment was missed in March, the Kingdom has paid for April and is expected to meet May's requirements. The delay in payments is clearly a sign of Saudi Arabia's growing financial problems and may jeopardize its arms sales with the United States.¹⁴

Plans for integrated air defense systems are moving forward slowly. At present, Saudi Arabia still does not have a truly integrated C⁴I and battle management system for its land-based air defense units, which have to operate independently or rely on limited data links and voice communications. At current rates, a truly integrated system will only be available in 2002-2003.

Table 8.1Gulf Land-Based Air Defense Systems in 2002

<u>Country</u>	<u>Major SAM</u>	<u>Light SAM</u>	<u>AA Guns</u>
<u>Bahrain</u>	8 IHawk	60 RBS-70 18 Stinger 7 Crotale	15 Oerlikon 35 mm 12 L/70 40 mm
<u>Iran</u>	16/150 I Hawk 3/10 SA-5 45 HQ-2J (SA-2) ? SA-2	SA-7 HN-5 5/30 Rapier FM-80 (Ch Crotale) 15 Tigercat SA-7 Stinger (?)	1,700 Guns ZU-23, ZSU-23-4, ZSU-57-2, KS-19 ZPU-2/4, M-1939, Type 55
<u>Iraq</u>	SA-2 SA-3 SA-6	Roland 1,500 SA-7 (SA-8 (SA-9 (SA-13 (SA-14, SA-16	6,000 Guns ZSU-23-4 23 mm, M-1939 37 mm, ZSU-57-2 SP, 57 mm 85 mm, 100 mm, 130 mm
<u>Kuwait</u>	4/24 I Hawk 4/16 Patriot	6/12 Aspede 48 Starburst	6/2X35mm Oerlikon
<u>Oman</u>	None	Blowpipe 34 SA-7 <u>14 Javelin</u> 40 Rapier	10 GDF 35 mm 4 ZU-23-2 23 mm 12 L-60 40 mm
<u>Qatar</u>	None	10 Blowpipe <u>12 Stinger</u> 9 Roland 20 SA-7, 24 Mistral	?
<u>Saudi Arabia</u>	16/128 I Hawk 4-6 Patriot battalion's of 3 batteries each.	189 Crotale 400 Stinger 500 Mistral <u>500 Redeye</u> 17/68 Shahine mobile 40 Crotale 73 Shahine static	<u>50-73 AMX-30SA 30 mm</u> 92 M-163 Vulcan 150 L-70 40 mm (in store)
<u>UAE</u>	5/30 I Hawk Bty.	20+ Blowpipe <u>Mistral</u> 12 Rapier 9 Crotale 13 RBS-70 100 Mistral	42 M-3VDA 20 mm SP 20 GCF-BM2 30 mm
<u>Yemen</u>	SA-2, SA3, SA-6	<u>SA-7, SA-9, SA13, SA-14</u> 800 SA-7/9/13/14	50 M-167 20mm 20 M-163 Vulcan 20mm 100 ZSU-23-4 23 mm 150 M-1939 23 mm 120 S-60 37 mm KS-12 85 mm

Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Sentinel, and Jane's Defense Weekly, and material provided by US experts.. Some data adjusted or estimated by the author.

The Effectiveness of the Saudi Air Defense Force and Options for GCC and Southern Gulf Cooperation

The success of the Peace Shield and Falcon Eye systems has led to an improvement in the capability of the Saudi Air Defense Force, and should be a major step in helping it to absorb and operate the Patriot missile. Saudi Arabia still, however, has a C⁴I system with serious weaknesses and only limited ability to deploy and operate a layered air and land-to-air defenses.

Saudi sources indicate that in a crisis or wartime, the Kingdom will establish a fighter patrol line like the Fahd Line near the center of the Gulf, and use other fighters to cover the forward area on its borders, a scramble line where aircraft on alert take off the moment an intruder comes close, and then use inner defense lines which will be covered by its Improved Hawk missiles and by the Patriot. Saudi commanders in local operations and exercises are exercising this system. Saudi junior officers exercise command, although some workstations are still foreign-manned. Saudi Arabia has also obtained 27 mission-planning systems from the Sanders Corporation to provide the mission planning support that the RSAF lacked during the Gulf War.

The Need for Integrated Air Defense

The most immediate problem Saudi Arabia now faces is the need to integrate its air defense and airborne maritime patrol system; tie together its E-3A, intelligence aircraft, and Combined Air Operations Center into an effective system for managing fighter and surface-to-air missile operations; create joint air defense capabilities, and to create effective integrated defenses with the other Gulf States. This is crucial to both Saudi Arabia's future security and the ability of the West to reinforce Bahrain and Kuwait effectively, because of their small size and air space. Kuwait is particularly vulnerable because of its common border with Iraq, and its proximity to Iran. It desperately requires a survivable air defense and land and maritime surveillance system. No Kuwaiti-based system can provide such characteristics unless it is integrated into a Saudi system, preferably with close links to Bahrain, Qatar, and the UAE.

The GCC is implementing a project called Hizam at-Ta'awun (HAT-Belt of Cooperation). This project is a two-tier program to establish a telecommunications network linking the military headquarters of the GCC states and then link the states' radar systems. Ericsson of Sweden was awarded a \$70 million contract for the communications link, and the

U.S.-based Hughes Space and Communications won an \$88 million contract for the radar link. The first phase of this program was completed in 2001.¹⁵

The resulting system does more to provide secure communications between the national air defense command and control centers of the GCC states than to actually integrate air defense, but it can provide early warning and some intercept and land-based air defense data in the event of an air attack by Iran or Iraq (It would not necessarily provide useful data in a ballistic missile or low-altitude air or cruise missile attack.) At least on paper, the resulting combination of a Raytheon-developed integrated air battle management system, and an Ericson secure optical fiber communications system, should allow the GCC to finally develop capabilities that should have been in place well over a decade ago.

There has been some progress in creating such an integrated system.¹⁶ Kuwait seems to be committed to purchasing a modern air defense system that could be integrated with the GCC and Saudi systems. In late 1997, Kuwait launched a \$1.2 billion project to build a C³I network to eventually be integrated into similar networks in the other five GCC states. Ironically, the slow pace of the GCC-wide effort has hampered the Kuwaiti project. As of May 2000, the GCC had still not moved forward beyond the creation of optical fiber data links designed to support communication between the leaders and high commands of the Southern Gulf states. Because the two systems are to be integrated, it is important that contractors have information about the GCC-wide system in order to make the Kuwaiti system compatible. The contract will involve the creation of a joint operations center, mobile command centers for each of the services, and battalion command centers.¹⁷

The air defense systems of Qatar, Oman, and the UAE need to be fully integrated with the Saudi air defense system, and airborne maritime patrol data needed to be added to the air defense sensor and battle management system to deal with all the potential threats from Iran and Yemen, and to enhance beyond-visual-range combat capability. The smaller Gulf states have no hope of providing effective air defense on a piecemeal basis, or developing the kind of air combat training and exercise experience necessary to interoperate effectively with US and Saudi fighters and E-3As. They need to standardize and exercise operational procedures and IFF capabilities, and develop the kind of aggressor training needed to cope effectively with mass raids. In the long run, such cooperation will also be critical to linking the Patriot and follow-on

ATBM systems that will be needed to deal with the risk of proliferation. The slow pace of the Kuwaiti and GCC efforts towards integrated air defense indicate that these plans may take years to be fully implemented.

Theater Missile Defense?

Saudi Arabia cannot ignore its potential need for theater missile defense. Iran's missile strike capabilities are slowly improving, and Iraq will not be under UN sanctions forever. Most of Saudi Arabia's energy facilities, and much of its population, is located near its Gulf coast. A single missile strike against its capital with a weapon of mass destruction might seriously weaken the regime, or kill enough of its elite leaders to change the character of the Saudi state.

The US signed a shared early warning agreement with Saudi Arabia in 1998. This agreement called for the US to provide data on missile launches to the Kingdom that can be used to alert the Patriots and to provide some degree of warning for alert and civil defense purposes. It took the Kingdom nearly two years to sign a related shared secure communications agreement, however, and the US early warning system still uses different data links from the Saudi Patriot and other land-based Saudi C⁴I systems. As a result, the US will have to pass all early warning data to the air defense force through the more modern communications in the Saudi Navy.

More broadly, even Saudi Arabia's improved Patriots are not advanced anti-tactical ballistic missile systems, and even if the Kingdom buys the new Patriot 3, this will only provide adequate area coverage of key areas against Scud-type missiles, not against the more advanced types of missiles Iran has in development. At the same time, no more advanced system is currently available although the US Navy and Army have such systems under development, and the US Air Force is working on boost-phase defenses.

It is too soon for Saudi Arabia to make any investment in missile defenses beyond the limited point defenses provided by Patriot. At the same time, it must begin to consider the cost-benefits of a theater-wide system long before it makes an actual buy, particularly since such a system could take 5-10 years to deploy and cost tens of billions of dollars.

One option is to seek the deployment of US systems, and US sea-based systems might offer suitable emergency protection without requiring full time deployment. This, however, means establishing a new cooperative approach to theater missile defense, and one that so far is only in the discussion stage. The other option is for the Kingdom to buy such systems, but US so far has failed to brief the Saudis on its advanced ATBM systems, and will not have any such systems to sell or deploy before 2008 at the earliest. The Saudis have no funds for a near-term buy in any case. Even the full PAC-3 upgrade Saudi Patriots may slip until well after 2003, and the most the US can provide in the near-term is missile launch warning data that will allow Saudi Arabia to better use its existing Patriots and it may be possible to provide some degree of civil defense.

Endnotes

¹ Unless otherwise specified, the military data quoted here are taken from the relevant country sections of various annual editions of the IISS, Military Balance; CIA, The World Factbook; Jaffee Center for Strategic Studies, The Middle East Military Balance, Tel Aviv University, Tel Aviv; on-line editions of Jane's Sentinel series and Periscope, Jane's Intelligence Review, and Jane's Defense Weekly. The cut-off date for such material is January 2002.

Other sources include interviews with Saudi officials and military inside and outside of Saudi Arabia, US experts, and British experts. These are not identified by source by request of those interviewed. They also include the author's publications and other sources mentioned at the start of the section on Saudi Arabia, Dr. Andrew Rathmell, "Saudi Arabia's Military Build-up -- An Extravagant Error," Jane's Intelligence Review, November, 1994, pp. 500-504; Andrew Rathmell, The Changing Balance in the Gulf, London, Royal United Services Institute, Whitehall Papers 38, 1996; Edward B. Atkenson, The Powder Keg, Falls Church, NOVA Publications, 1996. they include various editions of USCENCOM, Atlas, 1, MacDill Air Force Base; Jane's Land-Based Air Defense; Jane's Military Vehicles and Logistics; Jane's Radar and Electronic Warfare Systems; Jane's C4I Systems

² For typical reporting see IISS, Military Balance, 1996-1997, 1999-2000 and 2001-2002. The Hawks are MIM-23Bs.

³ www.periscope.ucq.com/docs/nations/mideast/saudiara/army, Accessed January 7, 2002.

⁴ See IISS, Military Balance, 2001-2002, and www.periscope.ucq.com/docs/nations/mideast/saudiara/army, accessed January 7, 2002.

⁵ DSAA, June, 1996; Richard F. Grimmett, "Arms Sales to Saudi Arabia," Congressional Research Service, IB91007, August 28, 1991, p. 3; Defense News, September 23, 1991, pp. 1 and 36, March 1, 1993, p. 17, April 14, 1997, p. 3; Washington Post, November 12, 1991, p. C-1, New York Times, November 9, 1991, p. 3; Jane's Defense Weekly, October 19, 1991, p. 699, July 10, 1996, p. 33; Washington Times, October 24, 1991, p. A-4; Defense Daily, November 8, 1991, p. 223, November 11, 1991, p. A-14; Wall Street Journal, December 24, 1992, p. 2.

⁶ Raytheon background brief, February 1992; Defense News, September 23, 1991, pp. 1 and 36, March 1, 1993, p. 17; Aviation Week, January 4, 1993, p. 25; New York Times, February 17, 1993, p. D-4; Washington Post, December 24, 1992, p. A-8.

⁷ Defense News, March 1, 1993, p. 17, April 14, 1997, p. 3; Jane's Defense Weekly, October 19, 1991, p. 699, July 10, 1996, p. 33.

⁸ Jane's Radar: National and International Air Defense, 1994-1995, pp. 24-25; Jane's Air Defense Systems, 1994-1995, pp. 805-806; Jane's Command Information Systems, 1994-1995, pp. 47 and 127.

⁹ Flight International, July 23, 1991, p. 18; Jane's Defense Weekly, July 15, 1989, p. 57.

¹⁰ Flight International, July 23, 1991, p. 18; Jane's Defense Weekly, July 15, 1989, p. 57.

¹¹ Jane's Defense Weekly, July 15, 1989, p. 57, January 19, 1991, July 20, 1991, p. 97; London Financial Times, July 5, 1991, p. 5; Flight International, July 23, 1991, p. 18.

¹² Jane's Defense Weekly, January 19, 1991, July 20, 1991, p. 97; London Financial Times, July 5, 1991, p. 5; Flight International, July 23, 1991, p. 18.

¹³ The \$2.5 billion contract involves the services of 25 US government and 300 contract personnel. Associated Press, September 26, 1997, 1917. Boston Globe, May 21, 1997, D-7; Jane's Defense Weekly, May 28, 1997, p. 19; Jane's Military Exercise and Training Monitor, July-September 1996, p. 9.

¹⁴ Defense Week, May 31, 1999, pg.1, 20.

¹⁵ Jane's Defense Weekly, December 3, 1997, pg. 5.

¹⁶ Reuters, April 10, 2000, 0520, April 15, 2000, 0503.

¹⁷ Defense News, May 4, 1998, pg.3; interviews in Saudi Arabia in April 2000 and February 2001; Reuters, Kuwait, February 2001.