DEFENDING AMERICA:

A Near- and Long-Term Plan to Deploy Missile Defenses

Report by the
Missile Defense Study Team

The Heritage Foundation

Founded in 1973, The Heritage Foundation is a research and educational institute—a think tank—whose mission is to formulate and promote conservative public policies based on the principles of free enterprise, limited government, individual freedom, traditional American values, and a strong national defense.

Heritage's staff pursues this mission by performing timely and accurate research addressing key policy issues and effectively marketing these findings to its primary audiences: members of Congress, key congressional staff members, policy makers in the executive branch, the nation's news media, and the academic and policy communities. Heritage's products include publications, articles, lectures, conferences, and meetings.

Governed by an independent Board of Trustees, The Heritage Foundation is a non-partisan, tax exempt institution. Heritage relies on the private financial support of the general public—individuals, foundations, and corporations—for its income, and accepts no government funds and performs no contract work. Heritage is one of the nation's largest public policy research organizations. More than 200,000 contributors make it the most broadly supported in America.

Note: Nothing written here is to be construed as necessarily reflecting the views of The Heritage Foundation or as an attempt to aid or hinder the passage of any bill before Congress.

The Heritage Foundation
214 Massachusetts Avenue, N.E.
Washington, D.C. 20002-4999
202/546-4400

DEFENDING AMERICA: A NEAR- AND LONG-TERM PLAN TO DEPLOY MISSILE DEFENSES

Report of the Missile Defense Study Team

Chairman of the Team B Study Group: Ambassador Henry Cooper, Former Director of the Strategic Defense Initiative Organization and Chief U.S. Negotiator to the Geneva Defense and Space Talks with the Soviet Union

Editor of the Report: Dr. Kim R. Holmes, Vice President and Director of Foreign and Defense Policy Studies, The Heritage Foundation

Rapporteur: Baker Spring, Senior Policy Analyst, The Heritage Foundation

Research Assistant: Rob Chase, The Heritage Foundation

Team B Study Group

Lt. General James A. Abrahamson, USAF (retired), Former SDIO Director and Associate NASA Administrator

The Honorable Frank Gaffney, Former Acting Assistant Secretary of Defense for International Security Policy

Dr. Edward T. Gerry, Former Acting Deputy Director of the Ballistic Missile Defense Organization and SDI/BMDO Systems Architect

Lt. General Daniel O. Graham, USA (retired), Former Deputy Director of Central Intelligence and Director of the Defense Intelligence Agency

The Honorable William R. Graham, Former Director of the White House Office of Science and Technology Policy and Science Advisor to President Reagan, Former Deputy Administrator of NASA, and Former Chairman of the Strategic Defense Initiative Advisory Committee

Dr. Michael Griffin, Former Deputy SDI Director for Technology and NASA Associate Administrator

Dr. Jack Hammond, Former Director of Directed Energy SDI Programs and Assistant Director of SDI Kinetic Energy Programs

General Charles Horner, USAF (retired), Former Commander in Chief, U.S. Space Command

The Honorable Fred Iklé, Former Undersecretary of Defense for Policy and Director of the Arms Control and Disarmament Agency

Sven F. Kraemer, Former Director of Arms Control on the National Security Council Staff

The Honorable William Schneider, Former Undersecretary of State and Chairman of the General Arms Control General Advisory Committee

General Bernard A. Schriever, USAF (retired), Former Commander of Air Force Systems Command and Member of the Strategic Defense Initiative Advisory Committee

Dr. William R. Van Cleave, Head of President Ronald Reagan's 1980 Defense Transition Team and SALT Advisor to the Secretary of Defense

The Honorable Malcolm Wallop, Former U.S. Senator from Wyoming

The Honorable Vin Weber, Former U.S. Representative from Minnesota

Vice Admiral J. D. Williams, USN (retired), Former Director of Naval Warfare, Commander of the Sixth Fleet, and Member of the BMDO Advisory Group

ISBN 0-89195-234-9

Table of Contents

PREFACE

The threat of ballistic missile attack is clear, present, and growing. Rogue states such as Iran and North Korea are acquiring the capability to threaten the lives of Americans with nuclear devastation. Other states with already existing nuclear missile arsenals, such as Russia and China, are unstable and potentially threatening as well. Even though the technology is available to build a missile defense system, however, the United States remains vulnerable to attacks from ballistic missiles. This is a failure of potentially monumental proportions. It has been a failure primarily of political will.

Last November, House Republicans pledged to end this sorry legacy of intentionally keeping the United States of America vulnerable to missile attack. They promised in their Contract with America to deploy highly effective missile defenses — theater and national — at the earliest possible date. On February 15, the House modified this position somewhat, voting to downgrade the priority for fielding a national missile defense system by amending Title II of the National Security Revitalization Act (NSRA). Despite this change, the Republican leaders in the House and Senate are still committed to restoring momentum to America's missile defense programs. But to make this commitment a reality, they need a plan. Congress needs an alternative, or "Team B," missile defense plan that, unlike the self-constrained and go-slow programs of "Team A" (the Clinton Administration), will lead as soon as possible to a defense not only of U.S. forces overseas, but also of the American homeland.

Thus was born The Heritage Foundation's Missile Defense Study Group, or Team B. Inspired by the Team B study of Soviet military capabilities in the 1970s, which became a major impetus to the Reagan military buildup of the 1980s, Heritage's Missile Defense Team B, like its predecessor, has set out to challenge the prevailing assumptions of U.S. policy. What is being challenged today, however, is not the intelligence community's underestimation of the Soviet military threat, but the Clinton Administration's policy of intentionally leaving American cities and territory open to missile attack. By seeking to expand the application of the outdated and strategically irrelevant Anti-Ballistic Missile Treaty, the Clinton Administration is trying to give the doctrine of Mutual Assured Destruction (MAD) a new lease on life. And by purporting to defend U.S. forces and allies overseas while leaving the American homeland undefended, it is neglecting what should be the government's highest priority: to protect its citizens from destruction.

Team B believes that the U.S. also needs to maintain an ability to defend against modern aircraft and cruise missiles. The cruise missile is likely to become a more pressing threat because of its demonstrated effectiveness in the Gulf War. But the ballistic missile threat is now more pressing. The U.S. has no effective homeland or theater ballistic missile defense, and major political inhibitions must be overcome before this sad fact is changed. Hence, Team B focused on ballistic missile defenses in this report.

Heritage's Team B is made up of the finest minds on missile defense in the country. Chaired by Ambassador Henry Cooper, former Director of the Strategic Defense Initiative Organization, Team B was asked to devise a near- and long-term plan to deploy the most effective global defense possible. After examining alternative strategies, it became clear that only a missile defense system capable of spanning the entire globe could protect the American homeland and U.S. forces, allies, and friends overseas. And after assessing various technologies and architectures and asking which plan would be most cost-effective, Team B came to the conclusion that the best approach to achieving this global defense would be to devise a system that was deployed "first from the sea and then in space." Team B concluded that the already existing Navy Upper Tier program could be upgraded and expanded not only to protect U.S. forces and allies overseas from theater missile

threats, but eventually to become part of a larger strategic defense system comprising space-based elements that could provide coverage of the entire globe.

The Heritage Foundation has come full circle in publishing this report. In the early 1980s, under the leadership of General Daniel O. Graham (also a Team B member), The Heritage Foundation sponsored *High Frontier: A New National Strategy*, a study which served as a major inspiration for Ronald Reagan's decision to launch the Strategic Defense Initiative in 1983. However, because a decision to deploy was never made, much of the promise of SDI was lost. As this report demonstrates amply, the SDI program made much progress in research and development, but a misguided adherence to the ABM Treaty prevented the U.S. from making an unambiguous commitment to deployment. It is hoped that this report will enable the Congress to pick up where SDI left off and to set America, finally, on the road to deployment.

On behalf of my colleagues at The Heritage Foundation, I would like to thank Ambassador Cooper for his leadership in assembling the study team and in drafting the report. Hank is truly one of the heroes in the campaign to defend America. I would also like to thank the Team B members who took time out of their extremely busy schedules to make this report possible. All of us at Heritage were greatly impressed by their brilliance and dedication.

I would also like to thank Heritage Senior Policy Analyst Baker Spring, who served as rapporteur for the study. His insights and knowledge were indispensable to me as editor of the report. So, too, were the support and guidance of Lawrence Di Rita, Heritage's Deputy Director of Foreign and Defense Policy Studies.

Finally, all of us working on this project owe a debt of gratitude to Frank Gaffney, a Team B member and Director of the Center for Security Policy. Frank's work with the Coalition to Defend America, a grass-roots organization, has done much to educate the American public and politicians about the need for missile defense. That missile defense is back on America's political agenda is in no small part the result of Frank's efforts.

All of us at The Heritage Foundation are proud to be a part of this historically important study. We can only hope that Congress will share our sense of urgency about the need to defend America and implement Team B's plan to build a global defense system as soon as possible.

Kim R. Holmes
Vice President and Director of Foreign and
Defense Policy Studies

EXECUTIVE SUMMARY

The clear, present, and growing danger posed by ballistic missiles of all ranges compels an urgent response to defend the American people and their overseas troops, friends, and allies. The least expensive and most effective solution to this global problem is a global defense, deployed first at sea within the next three to four years and then in space by early in the next decade. But Clinton Administration policy and acquisition programs must be changed to achieve this defense capability. An additional $1 billion is needed in fiscal 1996 over that requested by the Clinton Administration, and about $6.3 billion more than likely Clinton Administration requests will be needed over the next five years.

The threat of ballistic missiles is global and growing. Missiles with warheads of mass destruction now can be launched with little warning from the sea or any of at least a half dozen states to attack cities in most of the world. For example, North Korea is developing a missile, called the *Taepo Dong* 2, which may have a range of 2,000 to 5,000 miles. Intercontinental ballistic missiles (ICBMs) marketed as space launchers could provide rogue states with the ability to attack the U.S. homeland faster than an effective defense can be deployed. A potential missile threat exists from Russia and China as well. Russia has inherited control of the Soviet Union's entire missile arsenal, which it continues to modernize. While a massive attack from Russia may now be unlikely, the problem of an accidental or unauthorized launch from that politically unstable part of the world should not be ignored. Long-range Russian missiles, including submarine-launched ballistic missiles, number perhaps 1,300 and are capable of delivering thousands of nuclear warheads. China's strategic missile arsenal, which it is modernizing, is far smaller, numbering perhaps 100.

Continuously on station, effective missile defenses are needed worldwide to counter the missile's potential for blackmail, terror, destruction, and disruption of U.S. military operations overseas. Without a ready response to such threats, the U.S. and its allies and friends will be subject to coercion and attack by otherwise third-rate powers armed with missiles and weapons of mass destruction.

Modern technology makes it feasible to develop and deploy affordable, effective ballistic missile defenses. All that is lacking is proper understanding of missile defenses and the political will to build them. It is also important to maintain effective defenses against modern aircraft and cruise missiles, but in that case there are no major political inhibitions to modernizing U.S. air defenses. Cold War ideology associated with the 1972 Anti-Ballistic Missile (ABM) Treaty must be overcome to build effective ballistic missile defenses.

The Clinton Administration is right that U.S. overseas troops, friends, and allies need to be defended from this growing threat of ballistic missiles. But defending America is equally urgent. No responsible U.S. leader should ask Americans to defend the citizens of other nations while leaving America defenseless. Yet that is precisely what the Clinton Administration is doing. Further, the Clinton Administration's plan would produce a sea-based defense in the Sea of Japan that could shoot down a missile launched from North Korea toward Japan, but not if it is launched toward the United States of America. Such a policy must be changed.

To counter this threat, The Heritage Foundation's Team B study group recommends that the U.S.:

✔ **Deploy global defenses as soon as technically feasible — first at sea and then in space.**

Specifically, a decision should be made now to deploy as soon as technically feasible the Navy's Upper Tier interceptor system and the *Brilliant Eyes* space-based sensor system. At the same time, technology demonstration programs should be conducted for two years for the Space-Based

Interceptor (SBI) and Space-Based Laser (SBL). Following a critical design review at the end of the two-year period, the most effective space-based defense architecture should be selected for deployment. About $1 billion would be required in fiscal 1996 and fiscal 1997 to support these initiatives.

✔ **Build Navy Upper Tier defenses.**

The quickest, least expensive, and politically least intrusive way to achieve a global defense against missiles, including for the U.S., is to exploit the nearly $50 billion already invested in the Navy's AEGIS system. The AEGIS system is a ship-borne weapons system that has been used to direct surface-to-air missiles, also on the ships, against enemy aircraft. A fully upgraded AEGIS system could be used as a sea-based defense against short-range or longer-range ballistic missiles. For a little over $1 billion, deployment could begin in about three years. For a total of $2 billion-$3 billion, 650 defensive interceptors could be deployed on 22 cruisers as early as in 2001.

✔ **Expedite *Brilliant Eyes*.**

Brilliant Eyes is a sensor satellite capable of detecting missile launches and tracking the missiles in flight. This program should be fully funded and accelerated to assure that the Navy Upper Tier can defend the largest area possible against near-term threat missiles and can respond to likely offensive countermeasures. For $4 billion-$5 billion, the system could achieve an initial operational status as early as 2001. Deployment could begin as early as 1999.

✔ **Fully fund Navy Upper Tier and *Brilliant Eyes* programs without ABM Treaty restraints.**

The Navy Upper Tier and *Brilliant Eyes* programs should be fully funded as a top national priority. However, these programs should be conducted without the constraints imposed by an expansion of the scope of the ABM Treaty that would limit theater missile defenses, as well as strategic defenses. Such an expansion would impose limits on, among other things, interceptor speed and the locations of deployed theater defense systems. Expanding the scope of the ABM Treaty would prevent engineers from exploiting off-the-shelf technology to defend overseas U.S. troops, friends, and allies and Americans at home.

✔ **Revive space-based defense programs and direct them toward deployment.**

Space-based defenses, including both Space-Based Interceptors (SBIs) and Space-Based Lasers (SBLs), are the most affordable and effective long-term systems to protect the U.S. homeland and to counter advanced theater ballistic missiles.

SBIs could intercept in space all ballistic missiles with ranges longer than about 200-300 miles. SBIs could also intercept some long-range ballistic missiles in their boost phase, or shortly after launch. SBI systems would be simpler and far less expensive than ground-based interceptor systems of comparable capability. The most promising SBI system is the *Brilliant Pebbles* program. Fully approved as a Major Defense Acquisition Program in 1992, and subsequently scuttled by the Clinton Administration, a revived program could begin deployment at the end of the decade, with full funding and streamlined management.

SBLs are in the technology demonstration phase and could provide a boost-phase intercept capability against missiles with ranges greater than about 75 miles. They could also provide a robust mid-course discrimination capability to counter future offensive missile countermeasures, thereby maintaining the full effectiveness of SBIs or any other midcourse interceptors. With streamlined management and full funding, a prototype SBL could be tested late in this decade and a constellation of about 12 SBLs could be deployed by the middle of the next decade.

Both SBIs and SBLs are needed ultimately to provide an effective global defensive capability. However, in a budget-limited environment where the Clinton Administration is hostile to developing space-based defenses, Congress may be constrained in devising an appropriate acquisition

strategy for space-based systems. Therefore, to provide space-based options at a later date, Congress should accelerate research and development of both SBIs and SBLs for the next two years. This would require an additional appropriation of $200 million-$300 million per year for each program. A space-based defense architecture should be selected in 1997 to deploy by early in the next decade. The total cost for deploying the combined SBI/SBL space defense system is expected to be under $20 billion.

✔ **Refrain from limiting missile defense capabilities in negotiations with the Russians.**

The Clinton Administration is now engaging in negotiations with the Russians and several other states of the former Soviet Union concerning the future of the ABM Treaty. In the course of these negotiations, it has become clear that the Administration wants to expand the scope of the ABM Treaty, which imposes severe limitations on strategic defenses, to cover theater missile defense systems as well. According to press accounts, the Administration has expressed a willingness to impose limitations on the speed of the target missile interceptors may be tested against and on the speed of the interceptors.

The ABM Treaty, however, was never meant to impose any limitations on theater missile defense systems. It should be noted that the Soviets built theater anti-missile systems such as the SA-10 and SA-12 without asking to re-negotiate the ABM Treaty. Nor have the Russians consulted with the U.S. on their S-300 and S-500 systems, which they are marketing as being superior to U.S. theater defense systems. Congress should continue to insist that no such limitations be imposed.

✔ **Not give Russia a veto over U.S. missile defense options.**

The U.S. should insist that it will build defenses for America and overseas troops, friends, and allies without arbitrarily restraining systems to satisfy an outdated ABM Treaty — a treaty based upon a Mutual Assured Destruction (MAD) strategy of the Cold War, which Henry Kissinger, chief architect of the ABM Treaty, recently said "makes no sense in a multipolar world of proliferating nuclear powers."

The U.S. should take a principled position that effective global defenses are essential to preserving the peace in the new world disorder, and that all interested nations should cooperate in building and operating such defenses. The U.S. should be prepared to enter agreements on how prospective "partners," including U.S. allies, Russia, and other appropriate nations, might cooperate in building defenses and operating them to protect the world community against ballistic missile attacks. Such agreements could implement Boris Yeltsin's January 1992 proposal for a joint Global Protection System. However, the U.S. needs to make it clear to other nations, including Russia, that it intends to build the most effective defenses technically feasible at the earliest possible time. The U.S. should be amenable to a cooperative approach, but it needs to be clear that it is prepared to proceed independently. Under no circumstances should any foreign country, including Russia, have the right to veto U.S. efforts to defend America's people, friends, and allies against missile strikes.

✔ **Pass a new missile defense act.**

Congress should replace the Missile Defense Act of 1991 with a new act that makes clear these basic principles and policy guidance — particularly that state-of-the-art technology should be fully exploited to make all missile defenses as effective as possible. Such defenses should be built as quickly as possible.

PAGE 6 IS BLANK

THE BALLISTIC MISSILE THREAT

Ballistic missiles represent a major threat to civilian populations and military forces. Prior to a conflict, they are instruments of intimidation, blackmail, and threatened terror, especially if armed with weapons of mass destruction. If they are sufficiently accurate and powerful, missiles can directly threaten military forces and supporting infrastructure. Once used, their psychological impact can greatly damage the morale of an opponent.

This has been the case since German missiles, armed only with conventional high explosives, damaged more than 1.7 million British homes in 1944 and 1945. These German attacks with V-1 cruise missiles and V-2 ballistic missiles caused over 67,000 casualties.[1] Winston Churchill's remarks about the impact of these weapons are still appropriate: "[The missiles] imposed upon the people of London a burden even heavier than the air raids of 1940 and 1941. Suspense and strain were more prolonged. The blind impersonal nature of the missile made the individual on the ground feel helpless."[2] Although less than 20 percent of these missiles were V-2 ballistic missiles, they were particularly terrifying because there was no defense against them.[3]

Beyond being effective terror weapons, these missiles were recognized to have substantial military value. In referring to the German missiles in his 1948 memoir *Crusade in Europe*, the Supreme Allied Commander, General Dwight D. Eisenhower, noted: "It seemed likely that, if the German had succeeded in perfecting and using this new weapon earlier than he did, our invasion of Europe would have proven exceedingly difficult, perhaps impossible."

BALLISTIC MISSILES: STRATEGIC WEAPONS FOR ROGUES

Tactical ballistic missiles, again armed with conventional warheads, were used during the 1991 Gulf War. Iraqi Scud attacks created severe psychological pressures on the Israelis, and the effort to counter the Scud missiles was a major drain on allied planning and operations. Coalition aircraft and special forces combined may have been successful in destroying at most "a handful" of Iraq's mobile Scuds, and there is no definitive evidence of any mobile Scuds destroyed by air power independently.[4] The Gulf War also illustrated for the first time the impor-

1 Robin Ranger, "Theater Missile Defense: Lessons from British Experiences with Air and Missile Defenses," The Centre for Defence and International Security Studies, Lancaster University, 1994, pp. 10-11.

2 Winston Churchill, *Triumph and Tragedy* (Boston: Houghton, 1981).

3 By the end of the war, the British had developed effective air defenses against the V-1 cruise missile. But, until the present time, no effective ballistic missile defenses have been developed. Modern technology makes affordable, effective ballistic missile defenses feasible — the only issue has to do with understanding such defenses are needed and developing the political will to build them. It is also important to maintain effective defenses against modern aircraft and cruise missiles, but, in that case, there are no major political inhibitions to modernizing our air defenses. Cold War ideology associated with the ABM Treaty must be overcome to build defenses against the ballistic missile.

4 From a recent unclassified study sponsored by the Air Force: United States Air Force, *Gulf War Air Power*, Vol.

tant stabilizing effect of even a marginally effective active defense against ballistic missiles, which had enjoyed an unchallenged free ride to their targets since their first use in World War II. The defense provided a basis for keeping Israel out of the war. If Israel had entered the war Saddam Hussein might well have achieved his aim of breaking apart the U.S.-led coalition organized against him.[5]

By contrast, the existence of longer-range ballistic missiles — particularly ones armed with n clear weapons — would have made the situation in the Gulf intolerably unpredictable, possibl precluding the use of U.S. military force. As illustrated in Figure 1-1, with long-range ballistic missiles Saddam Hussein could have held cities throughout Europe at risk. It probably would have been impossible to form an allied coalition with Europeans had Saddam possessed the capability to target European cities with ballistic missiles, especially if they had been armed with chemical, biological, or nuclear warheads. The U.S. Congress would have been hard-pressed tc sanction the use of force had Iraq possessed ballistic missiles with intercontinental range.

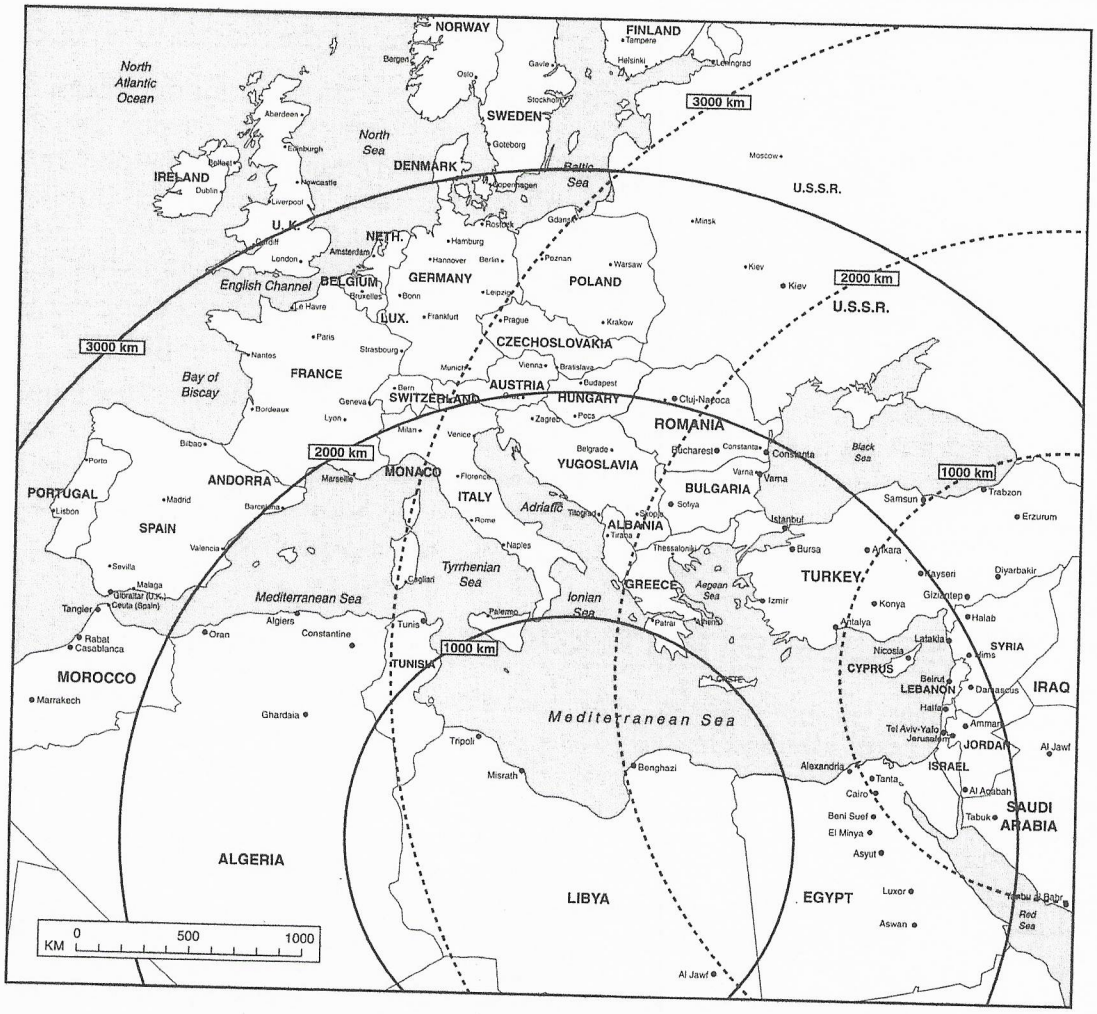


Figure 1-1. Potential Reach of Missiles Based in Libya (Solid Circles) and Iraq (Dashed Circles)

II, Part II (Washington, D.C.: Government Printing Office, 1993), p. 340.

5 *Patriot* was designed and built as an air defense system. It was given a very limited capability to defend itself against ballistic missile attack, but was never intended to defend people. *Patriot*'s real value in the Gulf War was strategic because it provided Israeli leadership an alternative to retaliating and being drawn into the war - which could have split the alliance arrayed against Iraq. Therefore, *Patriot* foiled Saddam Hussein's strategy to split the allied coalition.

These lessons will not be lost on rogue leaders. A former Chief of Staff of the Indian Army expressed his view that "The Gulf War emphasized once again that nuclear weapons are the ultimate coin of power. In the final analysis, they [the Americans] could go in because the United States had nuclear weapons and Iraq didn't."[6]

This potential for coercion is perhaps the ballistic missile's greatest value to a rogue leader. Beyond their coercive value in threatening distant cities and their ability to drain military resources, ballistic missiles, if sufficiently accurate and lethal, can also pose threats to military forces. By targeting such vulnerable transportation sites as ports and airfields, an adversary could block U.S. entry into a conflict zone and cut off logistics to support military operations. Missiles also could be used to attack U.S. troops overseas.

From the perspective of a rogue leader, ballistic missiles (for which there is currently no effective defense) could be the weapon of choice to threaten the rear of U.S. and coalition forces, especially in the face of American air superiority. Acquiring and maintaining missiles is much less expensive than a modern air force. Moreover, missiles with mobile launchers are much less vulnerable than aircraft to U.S. offensive operations. Finally, missiles armed with conventional munitions, if accurate enough, can be as effective as some weapons of mass impact.

Ballistic missiles are primarily strategic weapons. It is misleading to call even the widely proliferated shorter range missiles "tactical." The distinction between "tactical" and "strategic" missiles has been based on range, primarily for the purposes of negotiating arms control agreements. A more useful distinction would be to determine how the weapon is used. Virtually none of the Scud-type missiles fired over the past several years has been "tactical," that is, fired at enemy forces in the field. They all have been "strategic," or fired primarily at population centers. The main motivation of nations acquiring ballistic missiles today is not to use them "tactically" against enemy military forces. Rather, the motivation is to intimidate their neighbors and the rest of the world by threatening strikes against cities.

The mere possession of ballistic missiles and a program to develop nuclear weapons have given North Korea, a backward Stalinist state, substantial political power, leading the United States and its allies to make previously unthinkable concessions. Japanese spokesmen have expressed great alarm that the current North Korean missiles, even if armed only with high explosives, can strike nuclear power plants in Japan and create an enormous catastrophe. Defenses against even these "tactical" or "theater" missiles are therefore actually strategic defenses. Protecting the homelands of allies, friends, and coalition partners is no less — and no more — important than assuring the safety of the American people.

PROLIFERATION

In a March 1995 report, *The Weapons Proliferation Threat*, the Central Intelligence Agency's Nonproliferation Center observed that

> at least 20 countries — nearly half of them in the Middle East and South Asia — already have or may be developing weapons of mass destruction and ballistic missile delivery systems. Five countries — North Korea, Iran, Iraq, Libya and Syria — pose the greatest threat because of the aggressive nature of their weapons of mass destruction programs. All five already have or are developing ballistic missiles that could threaten U.S. interests.[7]

6 Selig S. Harrison and Geoffrey Kemp, "India & America After the Cold War," Carnegie Endowment for International Peace, 1993, p. 20.

Arms control and other diplomatic efforts may slow missile proliferation, but they cannot stop it. The missile proliferation threat, even to the U.S. homeland with long-range missiles, is real and growing. Third World nations are advancing their missile programs through indigenous development, the purchase of missile components, and the purchase of space launch vehicles for reportedly peaceful purposes. While space launch vehicles can be used for peaceful purposes, such as launching communications satellites, they also give would-be proliferants an inherent missile capability (Figure 1-2 illustrates how space launch vehicle components are largely interchangeable with ballistic missile components).

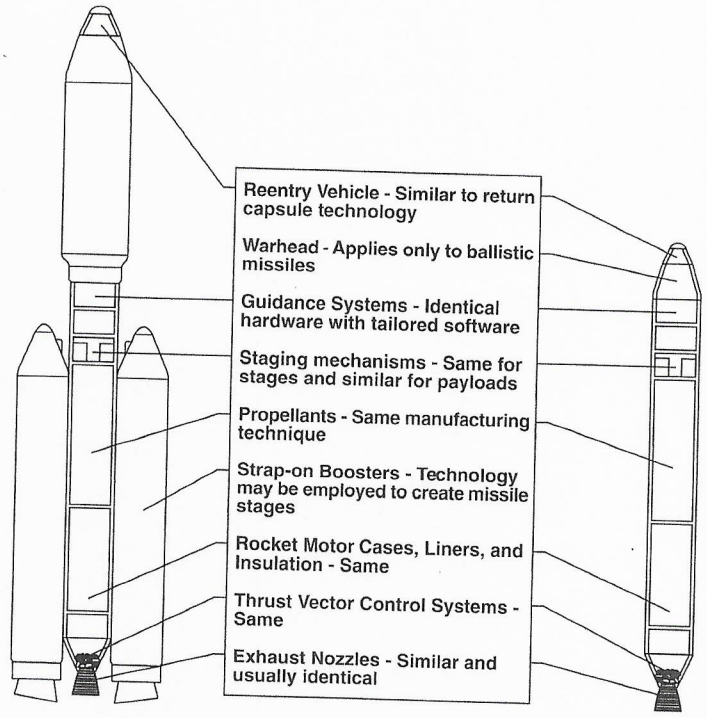


Figure 1-2. Comparison of Space Launch Vehicle and Ballistic Missile Components

While acknowledging the reality of the missile threat to U.S. overseas troops, friends, and al lies, the Clinton Administration is overestimating how long it could take for Third World cour tries to develop nuclear missiles. The Clinton Administration claims that missile attack threat from potentially dangerous Third World nations to the U.S. homeland will not arise for at leas ten years.[8] This estimate is based on the assumption that the states acquiring missiles will develop them indigenously. While it is questionable whether it will take ten years for Third World countries to develop missiles on their own, it is clear that proliferants could purchase long-range missiles and nuclear warheads at any time, with little or no advance warning. Further, rogue nations such as Iran and North Korea are acquiring submarines and may even launch shorter-range missiles they now possess from an ordinary merchant ship off U.S. shore

Indeed, Saudi Arabia purchased the 2,000-mile range CSS-2 missile from China several years ago. Others, such as Iran and Syria, have purchased shorter-range ballistic missiles from North Korea. There is evidence, including from Russian General Victor Samoilov, who was charged

7 Central Intelligence Agency, *The Weapons Proliferation Threat*, March 1995, p. 2.

8 For example, see the February 7, 1995, Memorandum from the Deputy Secretary of Defense on "BMD Prograı Logic," quoted in *Congressional Record*, February 15, 1995, p. H1811.

with maintaining control over nuclear weapons, that nuclear warheads have disappeared from former Soviet sites.[9] There are also reports that nuclear weapons have been sold abroad covertly, particularly to Iran.[10] This evidence thus far has been downplayed by U.S. intelligence agencies, perhaps because they are worried more about indigenous development than they are about technology and missile transfers. Team B does not share Defense Secretary William Perry's conclusion that if Libya purchased SS-25 *Sickle* ICBMs, as has been speculated, then Muammar Qadhafi's troops, and perhaps employees, would not be able to operate them.[11]

The key to estimating how long the United States has to respond to a missile threat is not, as is currently the practice, to determine how long it takes a rogue state to produce ICBMs once it has decided to do so. Rather, U.S. planning should be based on how long a rogue state needs to field missiles once the intelligence community has convincing evidence that either their development or purchase is under way.

The evidence thus far is troubling indeed. For example:

- ✗ Iraq tested a booster with potential intercontinental range in 1990, only months after the U.S. intelligence community discovered what it was doing. After the Gulf War, it was discovered that Iraq had been pursuing an extensive, undetected, and covert program to develop nuclear warheads for its ballistic missiles. By authoritative accounts the Iraqis were within 18 months of having the bomb.[12]

- ✗ U.S. intelligence in early 1994 discovered that the North Koreans were developing a long-range missile dubbed the *Taepo Dong 2*. Then Deputy Secretary of Defense John Deutch testified on August 11, 1994, that the *Taepo Dong 2* may be able to strike U.S. territory by the end of this decade.[13] If so, this capability will have arisen only five years after its discovery.[14]

Once the basics of missile technology are mastered, adding more range to the missile is not a great technical challenge. It can be accomplished by adding more thrust and rocket stages. Further, it can be accomplished under the guise of developing space launchers. Every booster capable of placing satellites in orbit can deliver a warhead of the same weight to intercontinental range. And missile sales can create a new missile threat very quickly. After discussions with CIA officials, Republican Congressman Curt Weldon of Pennsylvania concludes that "We now have the unique situation where a Third World nation with the right amount of money can get access to a missile launch capability that can hit any city in America." He further speculates that this threat could develop "within less than three years."[15]

---

9 "Empty Containers," *U.S. News and World Report*, April 6, 1992, p. 22.

10 "Iran Has A-Bomb" *The European*, April 30, 1992.

11 See the Federal News Reporter Transcript Service transcript of a February 14, 1995, joint news conference with Secretary of State Warren Christopher and Secretary of Defense William Perry. Perry stated, "I do not believe Libya has an SS-25. Or if they have such a missile, they're not in a position to use it operationally." See also Arnold Beichman, "Ominous Delivery to Libya," *The Washington Times*, February 2, 1995, p. A-16.

12 David Kay, testimony before the Senate Committee on Foreign Relations, Senate Hearing 102-422, *Nuclear Proliferation: Learning from the Iraq Experience* (Washington, D.C.: Government Printing Office, 1992), p. 20.

13 Senate Committee on Armed Services, *Military Implications of the Chemical Weapons Convention* (Washington, D.C.: Government Printing Office, 1994), p. 81.

14 See Keith B. Payne, "Ballistic Missile Proliferation — An Audit," *Jane's Intelligence Review Yearbook*, 1994. The *Taepo Dong* is estimated to have a range of 2,000-6,000 miles. The upper range would enable it to reach most of the Northern U.S. See also "Senate Intelligence Committee Releases Unclassified Intelligence Assessments," Senate Select Committee on Intelligence News Release, May 1, 1995, p. 1. The CIA is quoted as believing that "it is unlikely P'yongyang could deploy Typo Dong I or Typo Dong II missiles before three to five years. However, if P'yongyang has foreshortened its development program, we could see these missiles earlier."

15 In "Rep. Curt Weldon Outlines Ballistic Missile Defense Plans," *Defense Week*, April 10, 1995, p. 8.

For those who think that missile threats from rogue nations are unlikely worst-case scenario from the future, a history lesson is in order. The fact is that America has already been threatened by a rogue state. One of the most serious and urgent threats the United States ever faced was from Soviet missiles placed in Cuba. History shows that Cuban dictator Fidel Castro recommended to his Soviet sponsors that a nuclear attack be launched against the U.S. It is fortunate for America and the world that cooler heads prevailed in Moscow, but Castro's actions prove that rogue leaders are willing to use nuclear weapons against the U.S.

FORMER SOVIET AND CHINESE ICBMS AND SLBMS

The existence of more than a thousand long-range missiles in former Soviet states and in China constitutes more than a hypothetical threat to U.S. territory, cities, and people.[16] Russia's fragile political situation could lead to a breakdown in the chain of command controlling its huge arsenal, a breakdown which occurred during the attempted coup against Soviet President Mikhail Gorbachev in 1991. Former CIA Director R. James Woolsey recently painted a bleak picture of future U.S.-Russian relations, noting that the current instability suggests a "two-in-three" chance that Russia will become hostile to its neighbors — and a "one-in-three" chance that Russia will become a serious threat to the U.S. The missile threat from Russia and China is discounted by the Clinton Administration. This can be justified only by assuming that the current political situation in the former Soviet Union and China precludes the launch of long-range missiles toward the U.S. The Clinton approach fails to account for the political fragility in the former Soviet Union and China and assumes that accidental or unauthorized missile strikes against U.S. territory will not happen.[17]

Some believe that Russia's agreement to target its missiles against the open seas greatly reduces the threat to America. This view is technically misinformed. Even if the Russians are following this totally unverifiable agreement, they could retarget their missiles in a matter of minutes. This fact was acknowledged by Russian General Igor Sergeyev, who is in charge of the Russian Rocket Forces, in a January 22, 1995, interview on CBS's *60 Minutes*.[18]

The existence of the Chinese intercontinental attack capability is largely ignored by the Clinton Administration. Since the Administration believes that the U.S. nuclear deterrent is sufficient to address the potential missile threat from Russia, it also seems to think that this deterrent is adequate for China. But, again, the Clinton Administration is being overly sanguine about the potential threat from China. As Harvard University professor Samuel Huntington argues, China could become a military threat to its neighbors:

> Buoyed by spectacular economic development, China is rapidly increasing its military spending and vigorously moving forward with the modernization of its armed forces. It is purchasing weapons from the former So-

---

16 The International Institute for Strategic Studies, *The Military Balance for 1994-1995* (London: Brassey's, 1994).

17 As reported by *Pravda* on February 21, 1990, a former Soviet General, Colonel General S.G. Kochemasov, revealed that the Soviet Union accidentally launched a nuclear-armed missile during maintenance operations — fortunately its engine misfired and the missile crashed only a short distance from its launcher. This accidental launch occurred before the break-up of the Soviet Union when confidence in the control of such missiles was far more justifiable than it is today.

18 During the January 22, 1995, exchange between CBS reporter Ed Bradley and General Sergeyev, Bradley asked how long it would take to retarget a Russian Topol missile (SS-25) — and Sergeyev responded, "The same time it will take the Americans to do it." Bradley then recounted in a voiceover that "It depends on the missile, he told us, but for most, only a matter of minutes."

> viet states; it is developing long-range missiles; in 1992, it tested a one-megaton nuclear device. It is developing power-projection capabilities, acquiring aerial refueling technology, and trying to purchase an aircraft carrier. Its military buildup and assertion of sovereignty over the South China Sea are provoking a multilateral regional arms race in East Asia. China is also a major exporter of arms and weapons technology. It has exported materials to Libya and Iraq that could be used to manufacture nuclear weapons and nerve gas. It has helped Algeria build a reactor suitable for nuclear weapons research and production. China has sold to Iran nuclear technology that American officials believe could only be used to create weapons and apparently has shipped components of 300-mile-range missiles to Pakistan. North Korea has had a nuclear weapons program under way for some time and has sold advanced missiles and missile technology to Syria and Iran. The flow of weapons and weapons technology is generally from East Asia to the Middle East. There is, however, some movement in the reverse direction; China has received Stinger missiles from Pakistan.... A new form of arms competition is thus occurring between the Islamic-Confucian states and the West.[19]

To be sure, China is now focused on economic development and is facing a possible succession struggle after Deng Xiaoping dies, but the U.S. should not dismiss China's future military potential. In fact, the very uncertainty of China's future is a cause of concern.

Political Aspects of the Threat and the U.S. Russian Relationship. Some opponents of vigorous U.S. missile defenses assume that drastic and dangerous Russian reactions would ensue because of aggressive U.S. programs to acquire effective defenses. Invoking the rationale of the Cold War superpower confrontation, they envisage a massive Russian strategic build-up, dangers to the arms control process, and Moscow's utter hostility. But Russia's economy cannot stand the drain of resources caused by the continuation of current strategic arms programs, let alone a massive increase in such outlays.

One strong Russian faction clearly recognizes that they face a need even more pressing than that of the United States for ballistic missile defenses against proliferation. At least in the past, Boris Yeltsin has been a member of this faction. In January 1992, he proposed a Global Protection System, offering to remove any political obstacle to create a multi-national defense against ballistic missiles. When the U.S. failed to capitalize on Yeltsin's offer, opponents of such cooperation gained the upper hand in Russia. Nevertheless, Russian advocates of cooperation in building a global defense against ballistic missiles, by whatever name, still exist.

The opponents, primarily representatives of the old military-industrial complex, advocate stifling U.S. anti-missile efforts. To this end, they are determined to keep intact the best tool available for this purpose — the 1972 Anti-Ballistic Missile (ABM) Treaty. Their opposition could be based on three regrettable, but understandable, premises:

❶ **The only area in which Russia today holds a distinct advantage over the United States is in deployed national ballistic missile defenses.** Moscow, including an area of about 80,000 square miles around the city, is defended against missile attack.

---

19 Samuel P. Huntington, "The Clash of Civilizations," *Foreign Affairs*, Summer 1993, p. 47.

❷ **The key element in any global missile defense system would be the space-borne system upon which all systems of other nations would rely for at least warning and tracking.** This would give the U.S. tremendous strategic advantages.

❸ **The Russians have very good anti-ballistic missiles for sale to any nation which may feel threatened by ballistic missiles,** and the products of a vigorous U.S. program, unconstrained by the ABM Treaty, would no doubt produce superior defensive systems.

So long as the U.S. is willing to restrict its anti-missile programs to comply with the ABM Treaty, these hard-line Russian factions will dominate, and Russia will remain uncooperative in the matter of ballistic missile defense. This faction has already shown a tendency to re-link the fate of the Strategic Arms Reduction Talks (START) process to strict compliance by America with the ABM Treaty. Upon signing the START I Treaty in 1991, the Soviets unilaterally stated that continued adherence to the ABM Treaty was key to their compliance with START. But Yeltsin's 1992 speech proposing a joint Global Protection System also proposed deeper START reductions that ultimately were incorporated into START II. Thus, the linkage can be overcome through a cooperative deployment of defenses. However, the old linkage has been re-established by recent Russian statements, almost certainly to affect U.S. politics as START II is considered by the Senate.

Should the U.S. decide to deploy missile defenses in concert with other nations or unilaterally, the Yeltsin faction will prevail, and the Russians will cooperate in fielding a defense against a common threat of missile proliferation. Such cooperation would be too obviously in their own interest, and continued refusal to cooperate too much to their disadvantage, for them to do otherwise.

CLINTON'S MISGUIDED OPTIMISM

The Clinton Administration's portrayal of the ballistic missile threat is unjustifiably sanguine, particularly with regard to threats to the territory of the United States. On the one hand, Administration officials have expressed alarm at the proliferation of weapons of mass destruction and ballistic missiles with which to deliver them. On the other hand, the Administration's official view mutes any sense of urgency about protecting the American people from that proliferation threat. The official view is that the only near-term threat is to overseas U.S. forces, friends, and allies and that it comes only from primitive, short-range, "tactical" or "theater" missiles of the Scud variety. Rogue states are alleged to be incapable of developing or otherwise acquiring missiles threatening to the U.S. homeland for the next 10-15 years. Moreover, the Clinton Administration argues that if these states acquire ballistic missiles, they will not be able to operate them. And the potential threat from literally hundreds of Chinese and former Soviet ICBMs is dismissed, presumably on the basis of Russia's and China's not being hostile enough to the U.S.

This optimistic view of the threat is not consistent with the observable pace and nature of proliferation, the technical facts of missile development, or the political instabilities of the former Soviet states and China. The Administration's assessment of the threat is consistent with its slow approach to developing ballistic missile defenses, raising concerns that the Administration's estimate of the threat may have been tailored to match its leisurely pace in building missile defenses. This is a huge mistake. The failure to respond to clear and ominous signs is, in fact, a failure of strategic proportions, potentially threatening U.S. interests worldwide and American security at home.

FUNDAMENTALS OF AN EFFECTIVE GLOBAL DEFENSE

An effective defense must be able to counter long-range, intercontinental-range ballistic missiles (ICBMs) in each of their three phases of flight: 1) the boost phase, 2) the mid-course phase, and 3) the terminal phase (see Figure 2-1). The boost phase occurs while the missile's fuel is still burning as it rises from its launcher. If the defense can destroy the ascending missile in its boost phase before it dispenses its warheads and decoys — fake objects intended to confuse the missile defense tracking system — it can be very effective in reducing the threat.

In the mid-course phase, which occurs in space, multiple warheads must be found among possible decoys, and each must be targeted by an exo-atmospheric defense interceptor. High fidelity sensors are needed to discriminate between warheads and decoys. As the weapons and decoys reenter the Earth's atmosphere, the lighter decoys slow down more quickly than the heavier warheads. Discrimination becomes a much easier task under these conditions. While the warheads can be found more easily after reentry, they may have the capability to maneuver like high-speed aircraft when they are deeper in the atmosphere and thus be difficult to intercept and destroy at this point in flight.[20]

In the late terminal phase, defenses cannot prevent missiles from exploding near the ground. Thus, they are not very effective against the damaging effects of such weapons of mass destruction as nuclear, biological, or chemical warheads.

A top priority is to destroy attacking missiles early in their flight, far away from their intended targets and preferably while they are still rising from their launchers — i.e., in their boost phase. They are at this time the most vulnerable to attack. In the boost phase missiles can be destroyed before they can sub-divide their lethal cargo into multiple, hard-to-hit weapons and decoys that are difficult to identify. Forward-based defenses, if sufficiently fast and close to the threat missile launcher, could provide a boost-phase defense. Boost-phase defenses could,

---

20 Achieving a maneuvering capability, lower in the atmosphere, is not particularly challenging, as the Gulf War Scud demonstrated. There, in some cases, the crudely modified design simply broke up on reentry, became aerodynamically unstable, and followed a very hard-to-hit "cork screw" path to its intended target. Such a crude design is not very accurate, but accuracy is not required to hit a city with a weapon of mass destruction. To counter even such a crude design (in the lower reaches of the atmosphere where such maneuvers are possible), a defensive interceptor must also be highly maneuverable — more maneuverable than current endo-atmospheric interceptors. Achieving effective intercept capability requires either interceptors with more maneuver capability than current designs or shifting to interceptors designed to intercept higher in the atmosphere, where aerodynamic maneuvers are much more difficult, or outside the atmosphere. This is the approach being taken by the Pentagon's Ballistic Missile Defense Organization (BMDO). Intercepting higher is also more effective in terms of protecting targets from weapons of mass destruction.

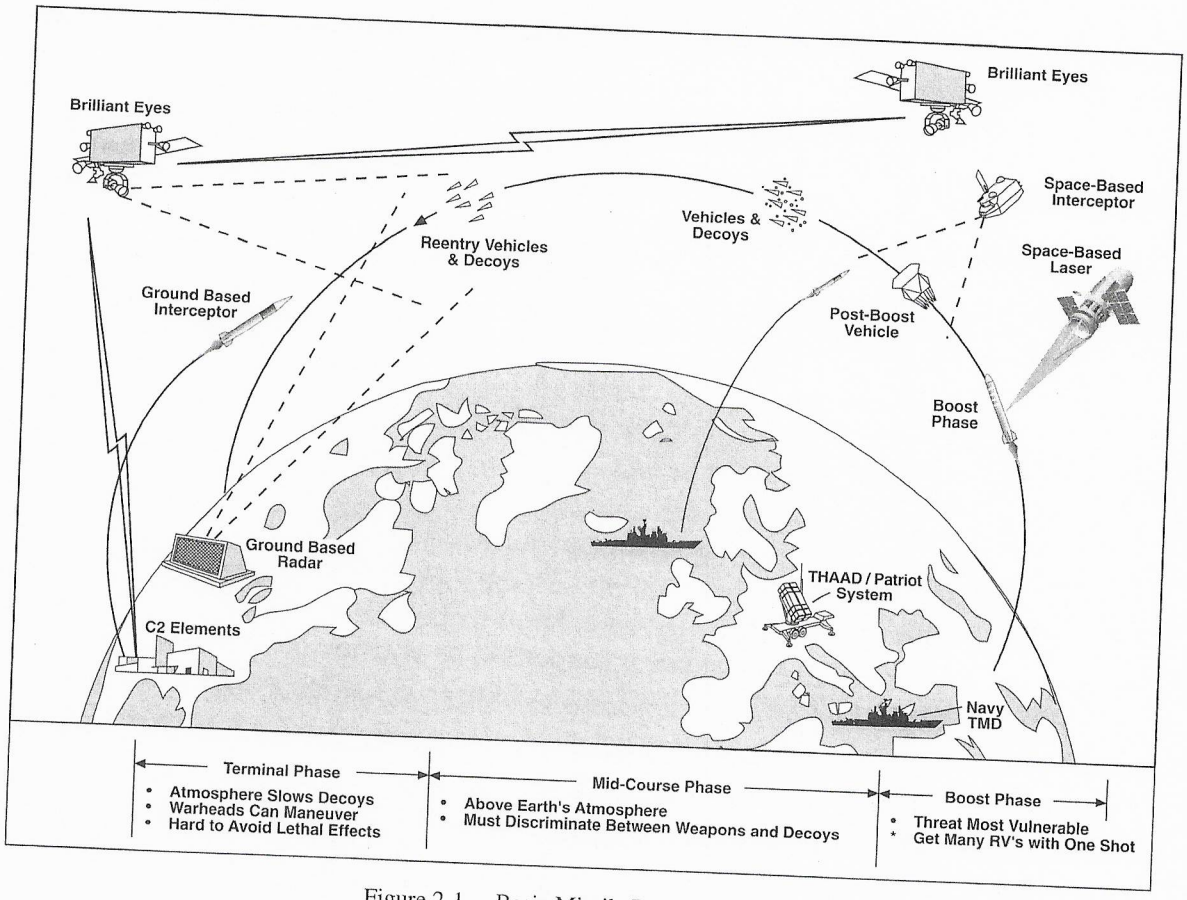


Figure 2-1. Basic Missile Defense Elements

in principle, be based on land, but doing this could prove to be politically controversial and intrusive. Space- and perhaps sea- and air-based defenses are therefore preferable.

Since about 70 percent of the Earth's surface is water, ship-based interceptors can get and stay close to regional "hot spots." These ship-borne systems could intercept some missiles in their boost phase. Sea-based interceptors could defend all of Europe from ships in the Mediterranean Sea. From many locations, they could maintain a "mid-course" and "terminal" defensive shield against missiles launched at the U.S.

Space-based defenses, involving both Space-Based Interceptors (SBIs) and Space-Based Lasers (SBLs), would always be on-station worldwide, and could provide many opportunities to intercept all but very short-range ballistic missiles in all stages of their flight. The faster the defensive interceptor, the farther away from the attacking missile launcher the defense can be placed, but the harder the task of "aiming" the defense. Also the longer the range of the attacking missile, the longer the vulnerability period of the boost phase — and hence the easier the task of the defense. Speed-of-light intercepts, such as with lasers, are feasible and are clearly a part of the needed missile defense architecture. Most of the technology for hit-to-kill interceptors has already been shown to work in space.

The most effective defense architecture employs defenses in layers, providing multiple intercept opportunities against attacking missiles in all their phases of flight. What the offense does to defeat one layer makes it harder to defeat another layer. And depending on where the defense is based, it may provide a *de facto* layered defense capability. Space-based defenses with both hit-to-kill and laser intercept capability, for example, can intercept all but the very shortest range missiles in all phases of their flight.

TYPICAL DEFENSE COVERAGE CHARACTERISTICS

Figures 2-2 and 2-3 illustrate that the longer the range and the faster the speed of the attacking missile, the smaller the ground area the missile defense is able to protect. These figures also show how external sensors can improve that coverage.[21] Against short-range missiles, such as the 350-mile Scuds used in the Gulf War, the Army's Theater High Altitude Area Defense (THAAD) offers substantial improvement over the improved versions of the *Patriot* missile (PAC(2) and PAC(3)). THAAD would enable an exo-atmospheric intercept approximately halfway between the attacking missile's launch point and the intended target of the attacking missile, which is located near the THAAD launcher. Against shorter-range missiles, sensors based in space, in the air, or on land offer no particular improvement in enlarging THAAD's coverage, although they might improve the system's discrimination capability and survivability. For example, defensive interceptors could be launched and engage targets even if the system radar were damaged or destroyed.[22] Furthermore, increasing THAAD's velocity would not greatly improve its coverage against 350-mile range missiles.

Against a higher velocity, longer-range attacking missile, such as the CSS-2 (approximately 2,000-mile or 3,000 km range), *Patriot* has essentially no capability, and THAAD's area coverage, without the aid of external sensors, is reduced by a factor of four, due to the reduced flight time after radar acquisition. However, with the aid of external sensors, THAAD's defended area coverage is increased by roughly a factor of two over the coverage achievable against the shorter-range missile due to the increased available flight time. If THAAD employed a faster interceptor, the improvement would be even greater.[23]

Against the 350-mile (600 km) Scud, doubling the interceptor velocity has relatively little effect. However, against the CSS-2, the higher velocity Navy Upper Tier provides an area of coverage that is larger by almost a factor of ten.

When connected with space-based surveillance and tracking sensors like *Brilliant Eyes*, or other sensors deployed on land, in the air, or at sea, sea-based interceptors could defend all of Europe from ships in the Mediterranean Sea. Assuring allied leaders and publics that such a capability exists could be essential in gaining their approval for moving troops into the region in a future crisis — as was illustrated by the difficulties of moving *Patriot* missiles into South Korea during the 1994 crisis. This attribute is why Team B believes that the Navy Upper Tier should be the nation's top priority TMD program. The early deployment possibilities of the Navy Up-

---

21 Improvements in the Army's *Patriot* — PAC(2) and PAC(3) — and the Navy's Standard Missile Air Defense systems will provide mobile land-based and sea-based endo-atmospheric interceptors, constituting the nation's first terminal missile defense to protect military forces. Such systems will have only limited capability in protecting civilians and military personnel from missiles armed with weapons of mass destruction. The Army's Theater High Altitude Area Defense (THAAD) is currently scheduled to be the nation's first wide-area defense, with options to field developmental systems in 1997-1998 and production hardware beginning in about 2002-2003.

22 The availability of early tracking information makes it possible to launch the defensive interceptor shortly after the attacking missile is launched, and before the local defense radar can track it, which can substantially increase the defensive interceptor's range and, therefore, enhance its coverage potential as well.

23 The coverage circles shown in Figures 2-2 and 2-3 are approximate. Real coverage depends on the details of the sensor coverage and the technical features of the interceptor's missiles and are generally not circular and generally not centered at the defense battery. The coverage circles are two-dimensional renderings of "dome charts" presented by Lt. General Malcolm O'Neill, Director of BMDO, to the House National Security Committee on April 4, 1995, as well as rough scalings from them to illustrate the performance against longer-range missiles and for the faster Navy Upper Tier interceptor.

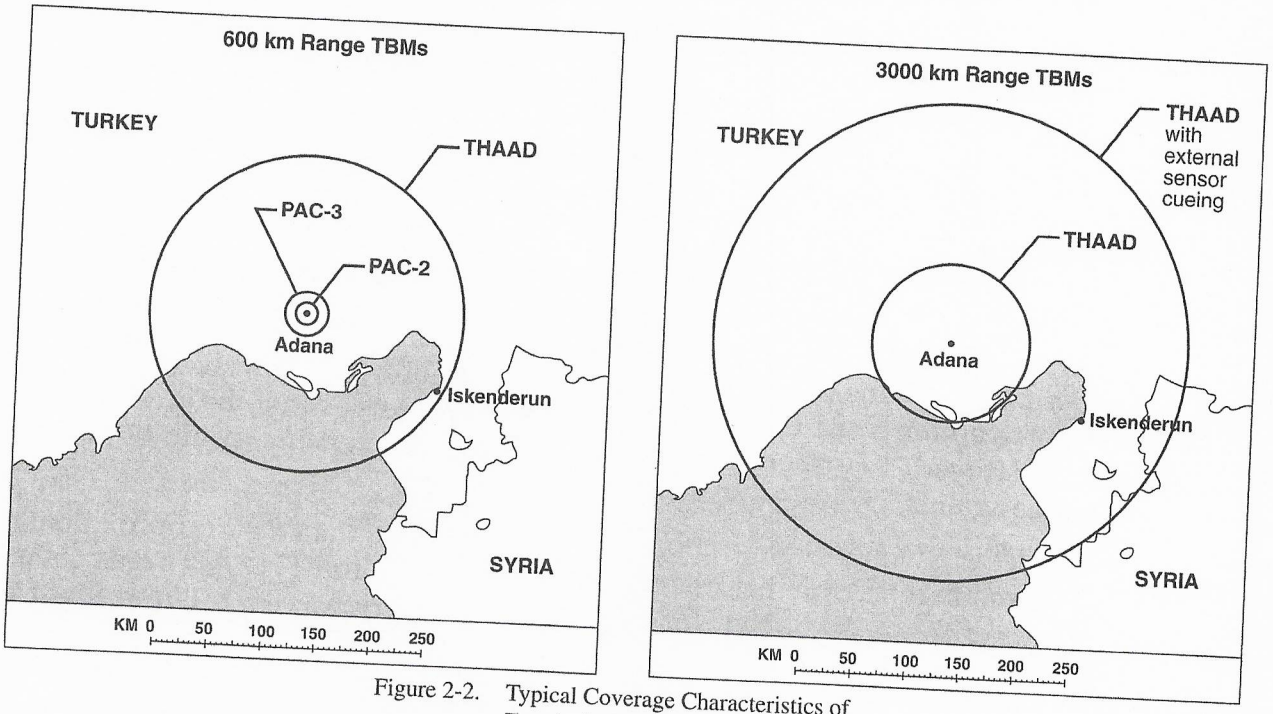


Figure 2-2. Typical Coverage Characteristics of Terminal and Wide-Area Defenses

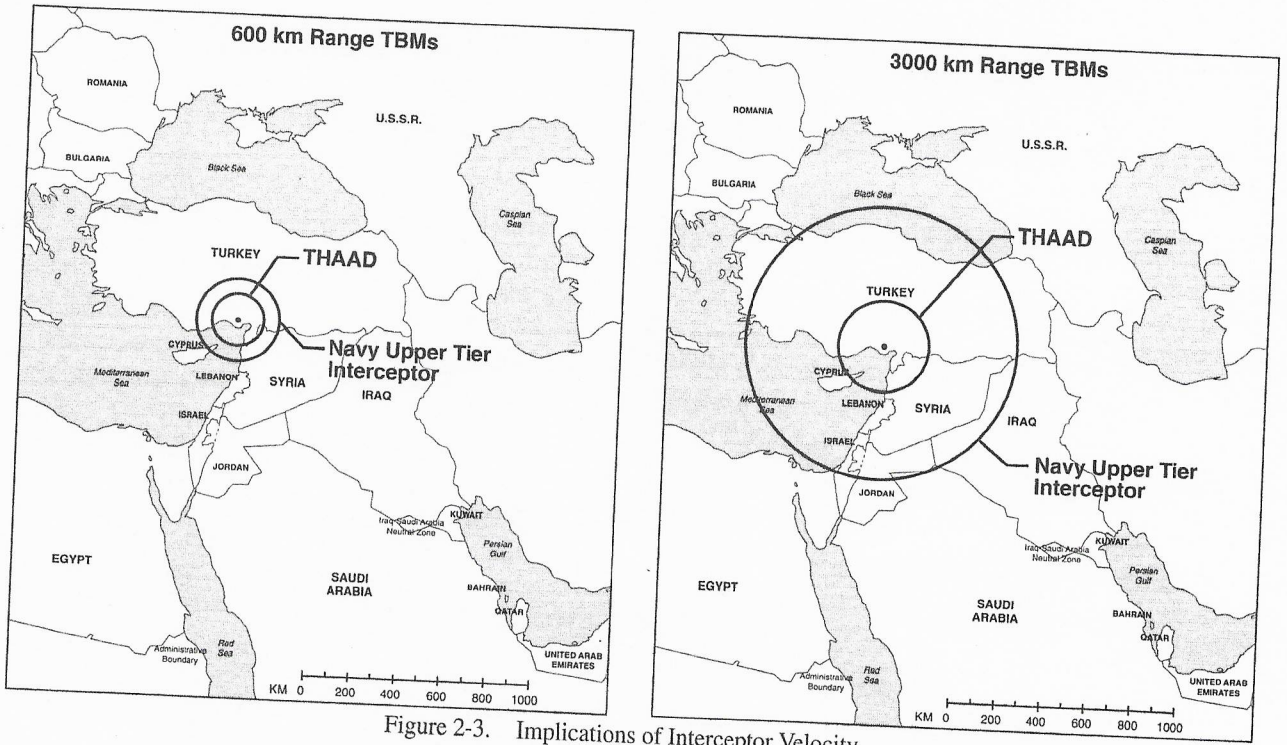


Figure 2-3. Implications of Interceptor Velocity on Defense Coverage

per Tier, using the existing AEGIS infrastructure in conjunction with other sensors, make it a bargain at many times the price.[24]

Sea-based interceptors can defend a large area, but space-based defenses cover the widest possible area. So long as they are fast enough to reach the missile target and powerful enough to destroy it, they can defeat attacking ballistic missiles in all phases of their flight. Kinetic energy space-based interceptors — ones that smash into a missile and destroy it on impact — do not have time to reach shorter range missiles in their boost phase, but they do have multiple opportunities to intercept them throughout the mid-course phase. As illustrated in Figure 2-4, a constellation of 1,000 Space-Based Interceptors would be able to stop missiles with ranges greater than about 200-450 miles, depending on whether the attacking missile is in a "lofted" or "depressed" trajectory.[25]

As illustrated in Figure 2-5, the effectiveness of a space-based interceptor system with 1,000 interceptors grows rapidly as the ranges of threatening missiles grow. This constellation becomes very effective against missiles with ranges greater than about 600 miles. For example, it would provide protection against 20 simultaneous launches of CSS-2 missiles, which have a range of about 2,000 miles.[26]

Space-Based Interceptors, however, can be challenged by the development of countermeasures, particularly submunitions released during the attacking missile's boost phase. Space-Based Lasers can defeat such countermeasures by destroying attacking missiles before they can release their decoys or submunitions. And in the mid-course phase (see Figure 2-1), lasers would perturb lighter decoys, permitting Space-Based Interceptors to discriminate and destroy attacking warheads.

Space-Based Lasers could attack any ballistic missile with a range of over about 75 miles. It could target the booster as soon as it clears the clouds, when it is most vulnerable. Knocking down missiles during their boost phase of flight, before they reach their full velocity, would ensure that the missile is destroyed before it has released its warheads or its countermeasures. For ballistic missiles carrying advanced chemical or biological submunitions, boost-phase intercepts could be essential for achieving an effective defense. If killed early in the boost phase, the booster and its payload will fall back on the launching country, which would pose a potential deterrent against launching such missiles in the first place.

The effect of neutralizing a ballistic missile during the boost phase is illustrated in Figure 2-6. For a 350-mile range missile — typical of the Scud missile employed by Iraq in the Persian Gulf War — total booster burnout occurs about 80 seconds after the missile is launched. The missile would clear the clouds in 20-30 seconds, becoming vulnerable to attack by space-based lasers during the next 50-60 seconds of flight. Because the highest acceleration of the missile occurs near the end of the booster burn, focusing the laser on the booster even one second before burn-

---

24 Achieving the full potential of the Navy Upper Tier requires the full exploitation of external sensor data. However, as then Deputy Secretary of Defense John Deutch explained to the Navy League on April 13, the Clinton Administration's version of the Navy Upper Tier limits this potential benefit by constraining the system to use only data from the AEGIS SPY-1 radar — a constraint which assures ABM Treaty compliance but also severely restrains the effectiveness of the Navy Upper Tier as a theater missile defense. See Bill Gertz, "Navy Missile Defense Shouldn't Be Issue In Talks, Deutch Asserts: Upper Tier Legal Under ABM Treaty," *The Washington Times*, April 14, 1995, p. A-3.

25 Depressed trajectory missiles fly outside the atmosphere for shorter periods of time and are therefore subject to interception by space-based interceptors for less time than standard missiles of equivalent range.

26 See "Conceptual and Burden Sharing Issues Related to Space-Based Ballistic Missile Defense Interceptors," *DOD Report to Congress* in response to directions in the FY 1992 Defense Authorization Act, March 1992.

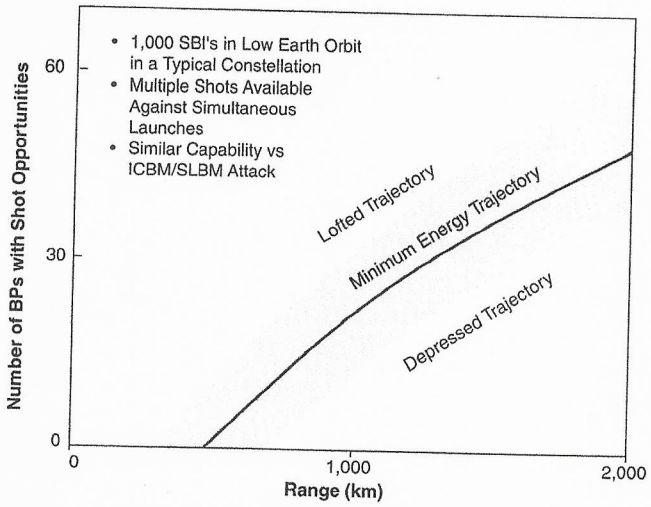
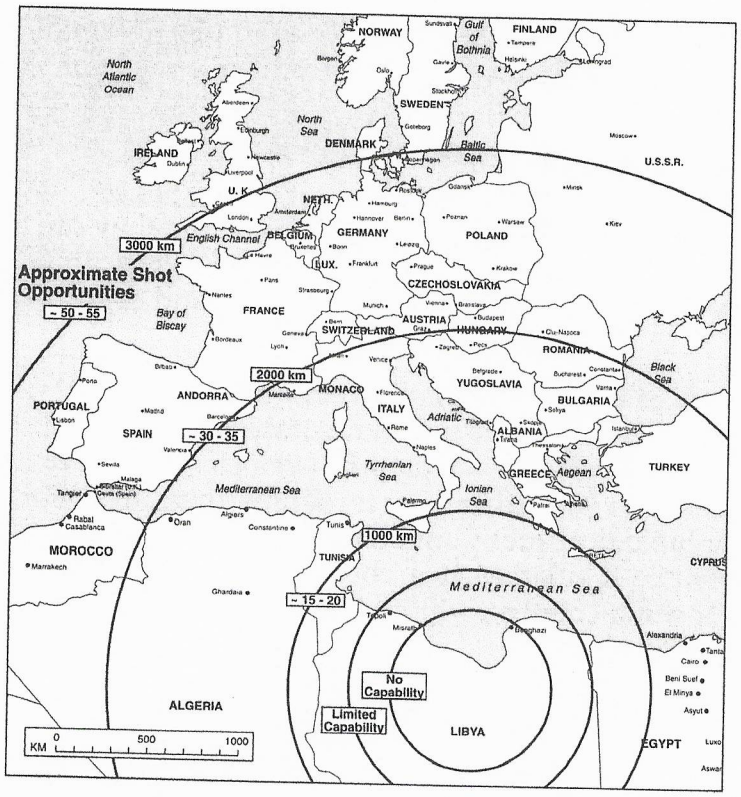
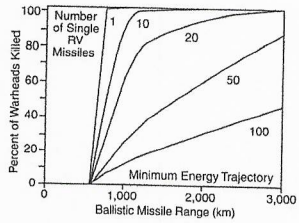
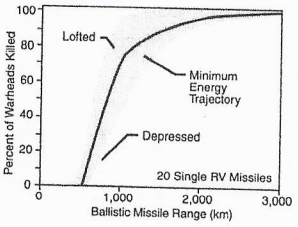


Figure 2-4. Intercept Opportunities for a Constellation of 1,000 Space-Based Interceptors







- **1,000 SBI's at Low Earth Orbit in a Typical Constellation**
- **Multiple Shots Available Against Simultaneous Launches**
- **Similar Capability vs ICBM/SLBM Attack**

Figure 2-5. Capability of 1,000 Space-Based Interceptors Against Libyan Missiles

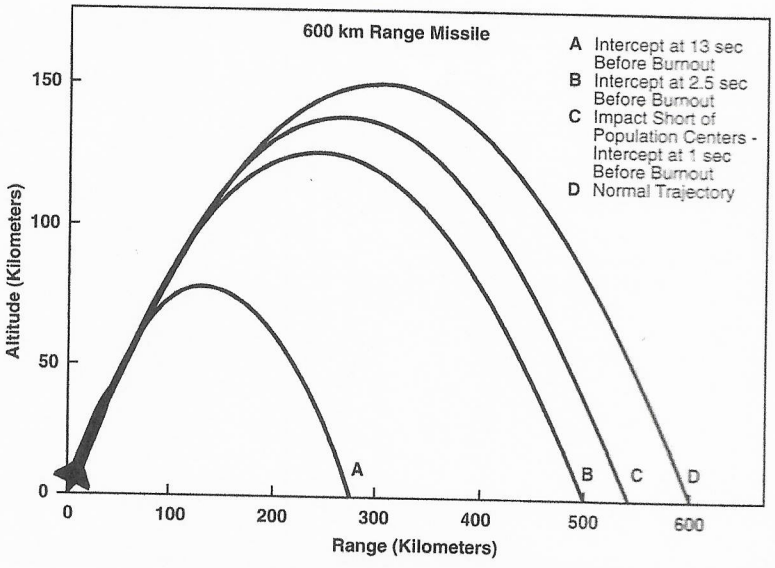


Figure 2-6. Shortfalls Induced by Intercepting a 600 km Ballistic Missile in Its Boost Phase

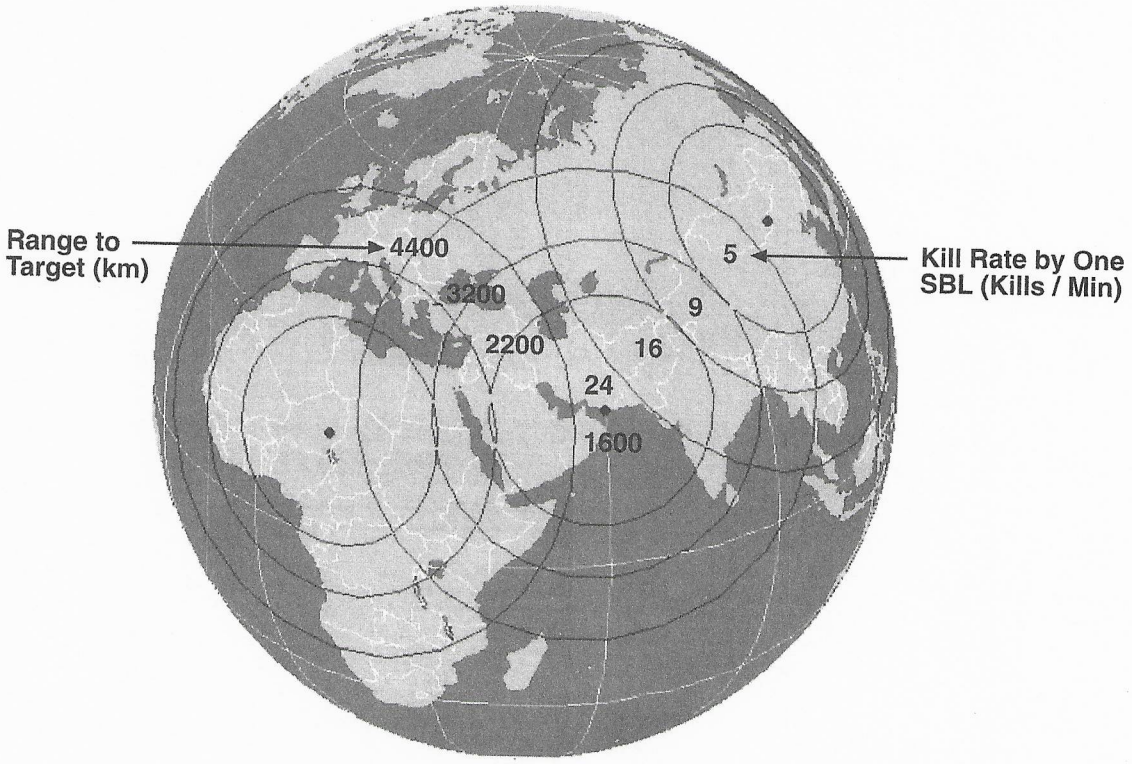


Figure 2-7. Space-Based Lasers Provide Overlapping Coverage Against a Global Threat

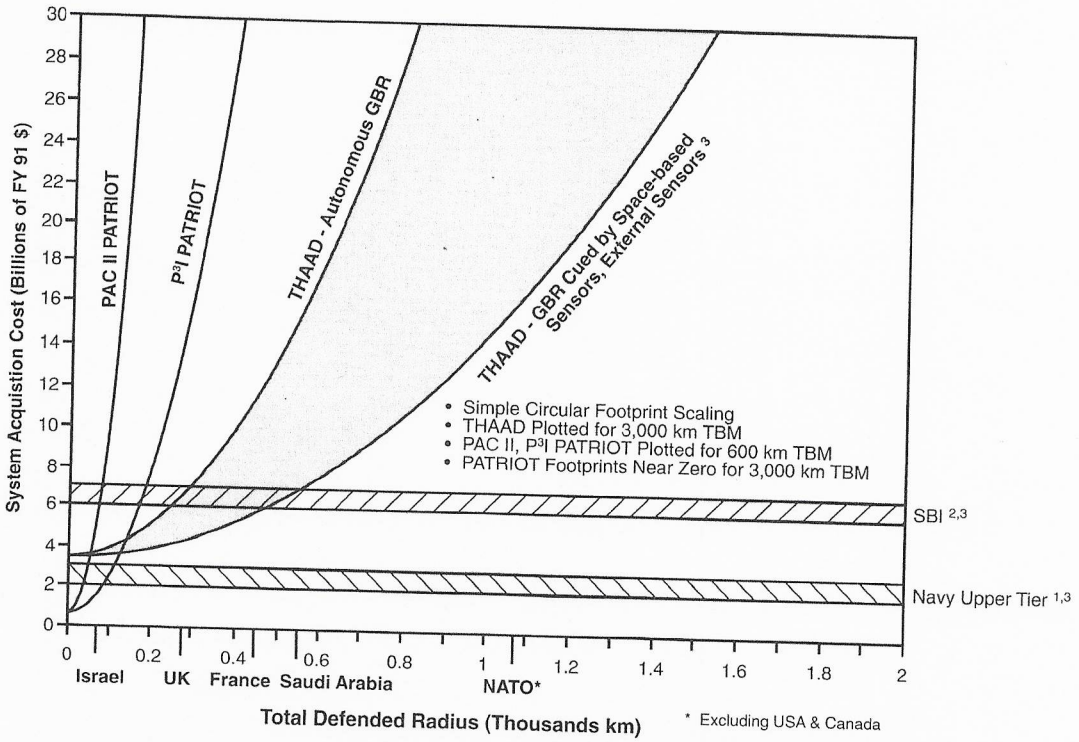
out would cause the missile's payload to fall short of its intended target by more than 30 miles. Destroying the booster at 13 seconds before burnout cuts the range by more than half. As a result, the debris from the destroyed missile could fall back on the territory of the country that launched it.[27]

Each of the deployed lasers could provide booster kill capability at a minimum rate of five per minute over more than one-tenth of the Earth's surface, as illustrated in Figure 2-7. A deployment of 12 space-based lasers would provide continuous coverage of all potential Third World launch areas with the capability of negating in boost phase a minimum of five ballistic missiles per minute, going from anywhere to anywhere. For theater-class missiles, which boost for one to two minutes, this means that a minimum of five to ten simultaneously launched missiles could be negated in boost phase. For intercontinental-range ballistic missiles, which boost for three to five minutes, a minimum of 15-25 simultaneous missile launches could be negated.

COST CONSIDERATIONS

Defending a wide area from space and, where possible, from the sea is far less expensive than building a very large number of ground-based interceptor sites. For example, Figure 2-8 illustrates that deploying the Theater High Altitude Area Defense (THAAD) system to defend Europe would cost substantially more than either the Navy Upper Tier or Space-Based Interceptors. THAAD is a ground-based system designed to intercept theater-range missiles. Further-

27 This discussion and Figures 2-6 and 2-7 are drawn from a March 14, 1995, letter to Senator Strom Thurmond from the industrial team conducting research and development on space-based lasers. The letter was signed by Vance Coffman, President of the Space and Strategic Missiles Sector of Lockheed-Martin Corporation; Timothy W. Hannemann, Executive Vice President, Space and Electronics Group, TRW; and Edward T. Gerry, President W.J. Schafer Associates, Inc. While Senator Thurmond solicited the analysis provided in the letter to him, its content does not necessarily reflect his views on the requirements for deploying space-based lasers.



Notes: 1)Navy Upper Tier Builds on ~$50B Invested in AEGIS Infrastructure..
2)SBI $6-7B Deployment Shown, $12-15B 10 Yr Lifecycle Cost.
3)Systems Requiring Brilliant Eyes ($4-5B) for Full Mid-Course Intercept Capability.

Figure 2-8. Cost to Defend Large Areas from the Ground, Sea, and Space

tors. THAAD is a ground-based system designed to intercept theater-range missiles. Furthermore, these systems do not require the expensive manpower and logistics support associated with moving ground-based systems into a conflict zone in a crisis.[28] As the number of countries with ballistic missiles continues to grow, and the range of missiles increases, the economic advantages of sea-based and space-based defenses also grows.

Figure 2-8 compares the total cost of deploying the Navy Upper Tier or 1,000 Space-Based Interceptors (both of which provide global coverage, including for the United States) with the costs of building Patriot and/or THAAD batteries to defend large areas. Key points to be drawn from Figure 2-8 include:

✓ **External sensor information certainly improves the cost effectiveness of THAAD in any given local regional context.** This information permits defensive interceptors to be launched long before their associated radar picks up an attacking missile. Therefore, the defensive interceptor can defend a larger area. Clearly, all theater defenses should be designed to exploit fully information from all kinds of sensors, including space-based sensors, beyond the radar specifically associated with a given set of theater defense interceptors. Indeed, future theater defense systems that fully exploit today's sensor and communications/data processing technology will not require a local (co-located) radar.

✓ **Even after external sensor data are exploited by THAAD, the Navy Upper Tier and Space-Based Interceptors are much less expensive in defending areas larger than about half of the European states of NATO.** The larger the area to be defended, the greater the cost advantage to sea- and space-based defenses.

---

28 During Desert Shield/Desert Storm, more than 450 C-141 equivalent sorties were required to transport ground-based defenses into the theater.

✓ **If an effective ground-based defense for the U.S. and Canada were added to the defense of the European NATO states, the costs of an all ground-based defense architecture would escalate greatly; and still much of the world would be unprotected — e.g., including Northeast Asia.** For example, the Bush Administration estimated that four to six sites for a ground-based system needed to provide an effective defense of North America, Alaska, and Hawaii would cost about $35 billion in constant 1991 dollars.

The Clinton Administration is budgeting about $2 billion over the next five years for a "technology readiness" program without any commitment to deployment. In response to congressional pressures, the Administration has been studying an option which, if exercised, could modify and make operational about 20 *Minuteman* missiles in four to six years for under $5 billion. While technically feasible in providing an interim limited defense (probably excluding Alaska and Hawaii for operational reasons), this option would not replace the need to spend an additional $35 billion to deploy a more effective ground-based system such as was contemplated by the Bush Administration. Thus, a less expensive, more effective sea- and space-based defense architecture can protect both the American people and their overseas troops, friends, and allies.[29]

EFFECTIVENESS CONSIDERATIONS

Ballistic missiles carrying chemical, biological, or nuclear warheads place the most stressful demands on a ballistic missile defense system.[30] Even one warhead that reaches its target would be catastrophic, especially if it were to land on a city. This capability to threaten American lives and territory in such a devastating way could give an enemy enormous power and influence over U.S. actions. Such a nuclear threat to the U.S. homeland could act as a sort of checkmate on the use of U.S. conventional forces against a hostile nuclear power. The challenge for an effective defense is to "devalue" this threat with a high degree of confidence in successfully intercepting an incoming missile. Layered defenses are required to achieve such high confidence.

For example, consider a salvo attack by ten single-warhead missiles.[31] A single-layer defense with 90 percent effectiveness (a demanding but achievable acquisition objective) would be expected to permit one missile to leak through — hence the need for a layered defense. A defense with two independent layers, each of which has 90 percent effectiveness, would be expected to destroy 99 of 100 missiles — or all ten missiles in nine of ten salvos of ten missiles each. If the effectiveness dropped to 80 percent, then the defense would be expected to destroy 96 of 100 missiles — or all ten missiles in at least six of ten salvos of ten missiles each. And if the effectiveness

---

29 Figure 2-8 was adapted from a figure in "Conceptual and Burden Sharing Issues Related to Space-Based Ballistic Missile Defense Interceptors," *DOD Report to Congress* in response to directions in the FY 1992 Defense Authorization Act, March 1992. The curves for *Patriot* and THAAD are unchanged from that report. The cost estimates for SBI and Navy Upper Tier are the costs described in this report. The trends depicted in the figure are illustrative of the scaling characteristics of the systems discussed. However, the calculations are necessarily very simplified and the *Patriot* curves are for a different threat missile.

30 Some have called chemical and biological weapons "poor man's nuclear weapons," and the ease with which they can be created — in secret — makes them potentially even more threatening than nuclear weapons. It is reported that Japanese investigators believe that the doomsday cult suspected of poisoning Tokyo's subway system on March 20, 1995, was preparing enough nerve gas to kill literally *billions* of people. See "Group Had Chemicals to Destroy Mankind," *The Washington Post*, April 1, 1995, p. A7.

31 Such a salvo, or simultaneous launch, of ten missiles would be more demanding of the defense than experienced during the Gulf War.

dropped to 70 percent, then one nuclear-armed missile from a ten-missile salvo would be expected to leak through the defense.

Assuring the independence upon which the validity of such calculations depends is not easy. Independently operated defensive layers and independent technologies do not necessarily assure independence from an integrated systems/engagement perspective. On the one hand, two intercept attempts (even by the same defense system) could be independent events, especially when the first misses cleanly. On the other hand, an exo-atmospheric hit-to-kill interceptor system, such as THAAD, and an endo-atmospheric proximity-fused, explosive-armed interceptor system, such as *Patriot*, may not have independent engagements, in spite of their independent technologies and operational characteristics.

For example, a near miss by THAAD could cause the attacking missile to break up in mid-course without being destroyed — and the resulting debris cloud and/or inadvertently maneuvering warhead could significantly reduce the effectiveness of a second intercept attempt, by either THAAD or *Patriot*, from that which existed in the absence of the first intercept attempt. In that case, the analysis of the last paragraph would overestimate the combined effectiveness of a THAAD/*Patriot* layered defense.

This problem is exacerbated by the fact that, except for reliability failures, clean misses by the first intercept attempt are unlikely. Therefore, high first-shot success probabilities are needed. To maximize the effectiveness of the first intercept attempt and to minimize the impact of engagement peculiarities on the lower tier defense, the first intercept should be attempted as high and/or as far away as possible. Furthermore, a truly independent first shot is required if very low leakage is needed — as it is to defend civilian populations and thereby assure U.S. freedom of action in the face of an adversary seeking to intimidate an opposing coalition.

Consequently, an effective boost-phase intercept capability would be most desirable. Furthermore, an effective early boost-phase defense would mean that the debris from the intercept would fall on the territory of the party launching the missile attack — a fact that could have substantial value in deterring such an attack in the first place, especially for missiles armed with weapons of mass destruction.

As illustrated in Figure 2-9, interceptors co-located with the defended target can do no better than intercept an attacking missile in the second half of its flight, that is, after it has reached its highest point or apogee. If located nearer the launch point, on the ground, in the air, or at sea, interceptors could destroy missiles in their ascent phase. Only if the interceptors were close enough to the incoming missile and fast enough to reach it could they knock down missiles in their boost phase.[32]

Figure 2-10 illustrates that a Space-Based Interceptor system has multiple shot opportunities for an ICBM-class target, beginning in the boost phase and extending throughout the entire mid-course phase. In fact, it can target a missile until it returns too deeply into the Earth's atmosphere, or below a 50 mile altitude.[33] A constellation of 1,000 space-based interceptors would put five interceptors within the range needed to destroy a 5,500-mile-range missile in its boost phase. It would put 30-35 interceptors within range to demolish the same missile in its post-boost phase. Finally, it would put 125-135 interceptors to have three independent opportunities (shoot-look-shoot-look-shoot) within range to destroy the missile in its mid-course phase. In ad-

32 Since boost-phase interceptors are most desirable, it is counterproductive to limit interceptor velocity and/or mobility — as has been suggested in the recent negotiations between the U.S. and Russia.

33 Specially designed interceptors could accommodate the atmospheric heating that would accompany reentry down to 25 to 35 miles.

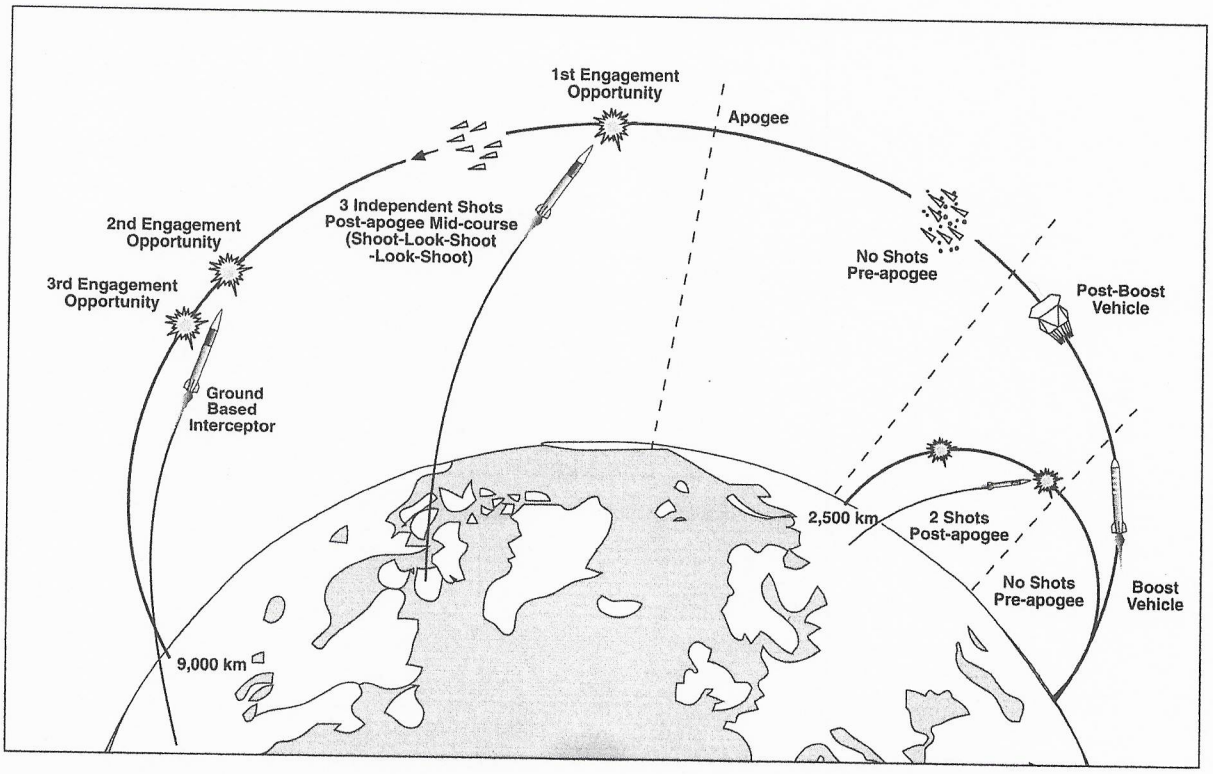


Figure 2-9. Shot Opportunities for Ground-Based Interceptors

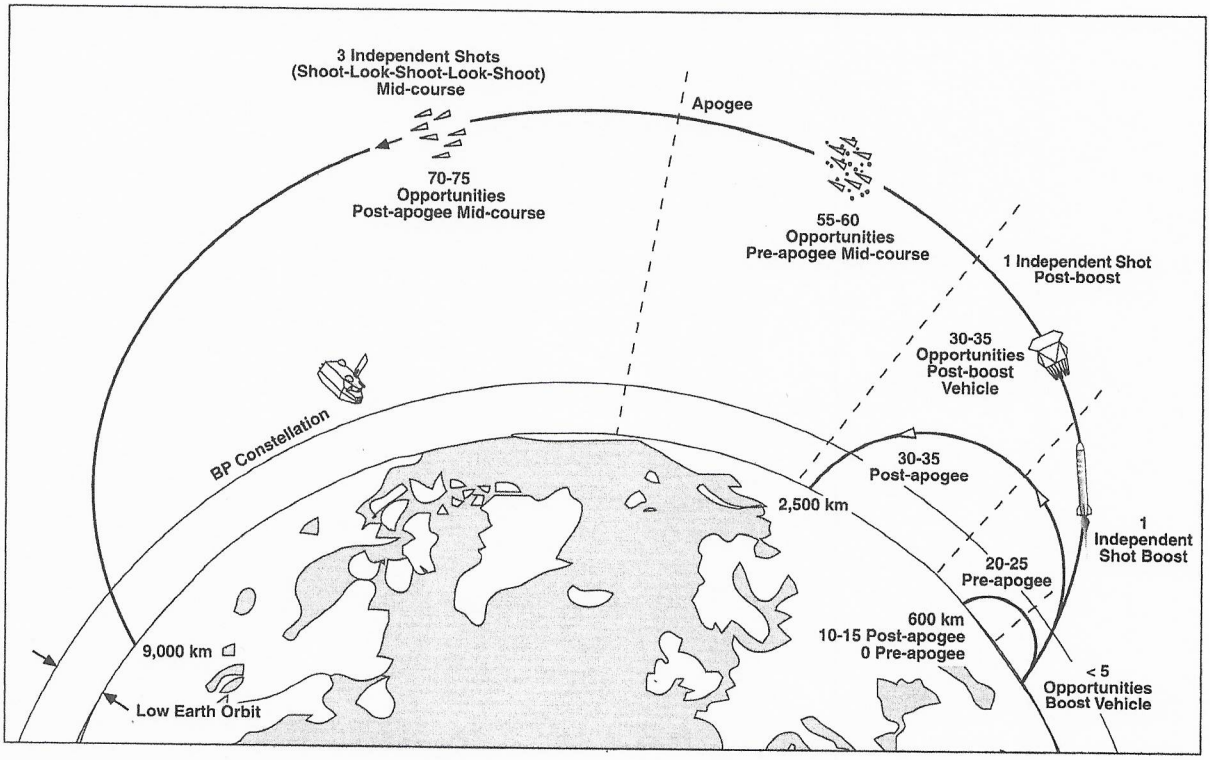


Figure 2-10. 1,000 Space-Based Interceptors Have Many Shot Opportunities

dition, there would be multiple opportunities to destroy intermediate- and medium-range missiles because they travel outside the atmosphere for a sufficient length of time. As the attacking missile's range decreases, however, these intercept opportunities occur later in the missile's flight.[34]

Improvements in initial interceptor designs (suitably modified for high acceleration operations) could extend the boost phase capability at least to the longer-range, longer burn time end of the theater missile threat spectrum.

The complementary features of a combined Space-Based Laser/Space-Based Interceptor system would provide a very impressive capability which would be difficult to defeat. It could provide boost-phase intercept capability against all but very short-range missiles (less than 75 miles). Moreover, its mid-course discrimination capability could substantially increase the effectiveness of Space-Based Interceptors and other mid-course interceptors as well. If efforts were taken to harden the booster against laser effects, the added weight would limit the attacking missile's mid-course countermeasures suite (additional warheads and decoys), improving the effectiveness of the Space-Based Interceptors. Conversely, efforts to counter the Space-Based Interceptors are likely to make the Space-Based Laser more effective by allowing less weight to be added to the missile body.

---

34 Intercept opportunities against the Gulf War Scud would have all been in their post-apogee flight. Nevertheless, detailed analysis of the data from the Gulf War has indicated that every Scud launched by Iraq could have been intercepted by this space-based interceptor constellation.

GLOBAL DEFENSE: FIRST FROM THE SEA, THEN FROM SPACE

The clear, present, and growing danger posed by ballistic missiles of all ranges compels an immediate response to defend the American people and their overseas troops, friends, and allies. The least expensive and most effective solution to this global problem is a global defense, deployed first at sea within three to four years and then in space early in the next decade. But the programs of the Clinton Administration must be changed.

Programs to build "theater" defenses to defend allies and U.S. forces overseas should not be given priority over programs to build defenses for American citizens and territory. To be sure, U.S. troops overseas should be defended against missile attack. But defending American territory and citizens is just as urgent. No responsible President should ask American taxpayers to pay for protecting the citizens of other nations while leaving America defenseless.

Yet this is precisely what President Bill Clinton is doing. In short, he is asking the American people to pay for the defense of other nations while leaving America vulnerable to missile attack. While the Clinton Administration views overseas defenses as worthy of support, it mistakenly believes that defending America will unleash a nuclear arms race. It apparently believes that reductions in offensive nuclear weapons will be reversed as other countries, including Russia, build more offensive weapons to overwhelm the defensive system.

This fear is unfounded. It should be recalled that the INF and START Treaties were negotiated while the U.S. advocated SDI development and deployment vigorously. And, in 1992, Russian President Boris Yeltsin advocated cooperation on building a global defense and even deeper START reductions — leading to the START II Treaty. Indeed, an effective global defense will discourage some nations from seeking to acquire ballistic missiles and will make American security commitments more credible. These attributes will promote U.S. non-proliferation goals.

To handle the global threat, defenses must be available worldwide and always "on the scene." A global presence is needed to counter the missile's potential for blackmail, terror, and destruction. It is politically difficult to mobilize defenses against a threat after it becomes pressing — as was illustrated by the difficulty in moving *Patriot* to South Korea in 1994 to defend against North Korean missiles. Without a ready response, including strategic defenses, the U.S. will be vulnerable to the blackmail and terror waged by otherwise third-rate powers that are armed with missiles and weapons of mass destruction.

GLOBAL DEFENSE: FROM THE SEA

Since most of the Earth's surface is water, ship-based interceptors can reach and stay close to regional "hot spots." Deployed at sea near the coasts of potentially threatening states, sea-based interceptors could destroy enemy missiles in their boost phase. In the open seas they could tar-

get enemy missiles in their mid-course phase, while deployed close to home or near the coastlines of allies, they could provide a terminal defense.

Sea-based defenses have other advantages. They are cost-effective because the Navy has already invested in the ships capable of carrying missile defense systems. Moreover, the Navy's ships are routinely deployed — they can establish a defensive shield between rogue states and nations they may threaten with a missile attack either immediately or in short order. Finally, they present no political problems when the need arises to deploy defenses during a regional crisis.

The earliest, least expensive, and politically least intrusive way to achieve a global defense is to build on the nearly $50 billion the U.S. has already invested in the Navy's AEGIS system. The AEGIS system has been deployed on Navy cruisers and destroyers to provide defenses against aircraft. The system can be upgraded and the ships armed with a modified *Standard* surface-to-air missile. The Navy system will initially provide protection against missile attacks for only a limited area, with the Navy Lower Tier program. For a broader level of defense, further modifications will be needed. These include moving to a new design for the *Standard* missile. If maximum effectiveness is to be achieved, the AEGIS system will need to be able to exploit targeting information from radar and other sensors, including those in space, that are not located with the defensive interceptors. Then Navy Upper Tier interceptors launched from AEGIS cruisers steaming in the Sea of Japan, the Mediterranean Sea, the North Atlantic, or the North Pacific could intercept missiles launched from North Korea, North Africa, and the Middle East toward various targets around the world, including the U.S.

The first generation Navy Upper Tier system, however, would not be very effective against ICBMs from the former Soviet Union. The reason: these missiles have "dimmer" signatures making them harder to hit with first generation interceptors and because the initial interceptors cannot reach Russian ICBMs headed toward the U.S. heartland, even if the AEGIS cruisers were based in North American ports. However, the interceptors, along with their launchers, could at little expense be placed on a barge in the Great Lakes — or on a concrete pad at Grand Forks, North Dakota — to fill this gap.

For a total of $2 billion-$3 billion more than the Clinton Administration has budgeted for Navy theater missile defense programs, the first generation of a Navy Upper Tier defense could begin operations in three years. Eventually a total of 650 Upper Tier interceptors could be deployed on 22 AEGIS cruisers. This would take no more than six years to accomplish.

This funding is sufficient also to connect external sensors, including space-based sensors, to the AEGIS command and control system. Providing targeting information to the AEGIS system from these external sensors will supplement the information provided by the AEGIS system's own SPY-1 radar and allow interceptors to "launch on remote data." This means the interceptor can be launched on the basis of the information provided by external sensors and before the attacking missile is picked up by the SPY-1 radar. This would permit attacking missiles to be intercepted much earlier in their flight trajectories, substantially widening the area that can be defended, especially against higher velocity, longer-range theater ballistic missiles. Without the ability to launch on remote data, the AEGIS system would be less capable than THAAD because the latter's radar is more capable than the SPY-1 radar. But with the ability to launch on remote data, the AEGIS system would be much more capable than THAAD (see Figure 2-3).

The Clinton Administration's reading of the ambiguous ABM Treaty has apparently led it to believe that allowing the AEGIS system to receive targeting information from sensors external to the system's own radar will violate the ABM Treaty.[35] The treaty prohibits giving non-ABM systems, including theater missile defense systems, an "ABM capability" or "testing them in an ABM mode." The meaning of these terms, however, was not agreed. Yet it is generally agreed that the ABM Treaty was never intended to impose any restrictions on theater defense systems. On this basis, Congress should direct the Navy to remove the ABM-Treaty-related restraints the Administration is imposing on the Navy Upper Tier system, and by extension on all other theater defense systems.

To achieve a limited U.S. homeland defense capability, the Upper Tier interceptors must be launched using "remote data" from ground-based, sea-based, air-based, or space-based sensors. These include early warning radars located in Greenland and the United Kingdom that were deployed prior to the ratification of the ABM Treaty. Other sensors such as early warning satellites that were deployed more recently might also track a missile attacking the U.S. These sensors can provide a wider range of data on an attacking missile than that obtained from the AEGIS SPY-1 radar co-located with the Upper Tier interceptors.

Fully exploiting state-of-the-art technology in this way would exceed the restraints being imposed unilaterally by the Clinton Administration under its interpretation of the ABM Treaty. These restraints not only limit the effectiveness of the Navy Upper Tier in defending our overseas troops, friends, and allies, but also would deny a defense for the American people.

Improvements in the AEGIS system would be required to defend against Russian or other more advanced ICBMs. These improvements include a larger interceptor with an improved sensor and countermeasures capabilities, which could provide an effective ship-based U.S. defense against a limited number of current generation Russian ICBMs.[36] Nevertheless, even at START II levels, Russia would retain many times the number of ballistic missiles needed to overwhelm even a second generation AEGIS defense in a nuclear strike.

GLOBAL DEFENSE: FROM SPACE

The global defense provided by the Navy Upper Tier System should be supplemented by space-based systems. These include space-based sensors such as *Brilliant Eyes*, which can also improve the capabilities of the Navy Upper Tier systems. Space-based defenses should include the Space-Based Interceptor (SBI), which is a kinetic energy weapon, and the Space-Based Laser (SBL), which is a directed-energy or laser weapon. These programs have been sharply curtailed or eliminated by the Clinton Administration. Ultimately, these space-based systems are needed to provide continuous global coverage, enhance the capabilities of terrestrially based defenses, and increase the effectiveness of an overall layered defense architecture.

Brilliant Eyes, with a fully capable sensor suite, could provide the Navy Upper Tier and THAAD systems with the greatest possible intercept range against near-term threat missiles. It could also enhance these systems' capabilities against offensive countermeasures. With a total investment of $4 billion-$5 billion, deployment could begin around the turn of the century. *Bril-*

35 Bill Gertz, "Navy Missile Defense Shouldn't Be Issue In Talks, Deutch Asserts: Upper Tier Legal Under ABM Treaty," *The Washington Times*, April 14, 1995, p. A-3.

36 The larger missile would require basing the interceptors in a "six pack" configuration, as opposed to the existing "eight pack" vertical launch configuration.

liant Eyes could also provide a much-needed space-based space surveillance capability, currently absent from the U.S. space architecture.

A robust system of space defenses consisting of SBIs and SBLs should be fielded as soon as funding and political constraints would permit. In addition to complementing terrestrially based defenses, SBIs and SBLs would complement each other as independent layers to the overall defense architecture.

SBIs could provide mid-course and high endo-atmospheric intercept opportunities against ballistic missiles with ranges longer than 150-300 miles. Against sufficiently long-range ballistic missiles, SBIs could have boost-phase intercept capability. SBI system concepts are simpler than those of current ground-based interceptor systems. U.S. industry, without government sponsorship, is already exploiting the same technology and system architecture needed to deploy low-altitude, satellite systems. Last year, the award-winning *Clementine* mission demonstrated the workability in space (called space-qualified) of essentially all of the first generation *Brilliant Pebbles* hardware. If the *Brilliant Pebbles* program were reinstated under streamlined management and with full funding, deployment could begin by the end of the decade for an investment of $4 billion-$5 billion.[37] The total acquisition cost for deploying and maintaining a 1,000 SBI constellation for ten years after deployment would be $12 billion-$15 billion.[38]

Space-Based Lasers, which are in the technology demonstration stage, would provide a boost-phase intercept capability against missiles with ranges greater than 75 miles. This capability is necessary to defeat attacking missiles that release multiple bomblets while rising from their launchers. SBLs could not intercept missiles during their mid-course and terminal phases, but would provide important discrimination data to help SBIs counter future offensive missile countermeasures. With streamlined management and full funding, a space-based prototype could be tested late in this decade and a constellation of twelve SBLs fielded by the middle of the next decade. Acquisition (including for an appropriate space launcher) and ten-year operating costs through about 2015 are estimated to be about $15 billion-$18 billion.

RELIEF FROM THE ABM TREATY IS ESSENTIAL

No effective U.S. homeland defense can be deployed so long as the ABM Treaty remains in force. This treaty limits the U.S. and the former Soviet Union to 100 ground-based interceptors at a single site.[39] Purportedly to "strengthen" the ABM Treaty, the Clinton Administration has sought agreements that would limit the effectiveness of theater defenses and unilaterally restrict U.S. research and development activities.

The ABM Treaty was intended to prohibit effective defenses against "strategic" ballistic missiles — although "strategic" ballistic missiles were not defined. Moreover, under the terms of the treaty, theater missile defense interceptors, those capable of countering short- and intermediate-range missiles, can neither be given an ABM "capability" nor "tested in an ABM mode." These terms were not defined by the ABM Treaty either.

---

37 *Brilliant Pebbles* was fully approved as a Major Defense Acquisition Program in 1992, with two contractor teams working toward Demonstration and Validation. It was cancelled in 1993 by the Clinton Administration.

38 This cost estimate includes replacing each SBI once — i.e., launching 2,000 SBIs over the lifetime of the system — through about 2015).

39 An effective defense requires more interceptors and much greater area coverage. As shown in Figure 2-6, the least expensive way to achieve global, effective defenses requires sea- and space-basing — both of which are prohibited by the ABM Treaty, if they are taken as "ABM systems."

The resulting ambiguities surrounding the ABM Treaty have caused many difficulties of interpretation. These have been exploited by ardent supporters of the treaty and the U.S. government to constrain rather than to provide expanded latitude for U.S. research and development programs. The result has been not only added cost and risk, but reduced system effectiveness. During the Cold War, a double standard arose whereby the U.S. was reluctant to charge the former Soviet Union with violations of the ABM Treaty, while it unilaterally insisted on strict restraints on American missile defense programs.[40]

The legacy of this double standard is evident today in the U.S.-Russian negotiations on theater missile defenses. For example, the Soviets deployed their SA-10 and SA-12 anti-missile systems without obtaining an agreement from the U.S. that they were theater missile defense systems and thus not subject to ABM Treaty restrictions. Nor have the Russians sought an agreement from the U.S. that their S-300 and S-500 interceptor systems are theater missile systems. Yet the Clinton Administration not only has consulted with the Russians regarding comparable U.S. systems, but also has made concessions that would severely limit U.S. theater defenses. These restrictions have included imposing limits on the velocity of the target missile in tests, the speed of the interceptor, and the range of the interceptor, among others.

The congressional leadership has been stoutly resisting the Clinton Administration's attempts to impose such restrictions, communicating its concerns to the President in no fewer than eight letters signed by virtually all of the chairmen of the key committees and subcommittees. In their May 2, 1995, letter in advance of the Moscow Summit, 50 Senators urged President Clinton not to take any actions "which would politically strengthen the 1972 Anti-Ballistic Missile (ABM) Treaty, expand its scope, increase the number of signatories, or otherwise add impediments to the development or deployment of effective U.S. theater missile defenses." Yet Presidents Clinton and Yeltsin issued a Joint Statement on May 10, 1995, which did just that. For example, it suggests limits on the scale of deployment "in number and geographic scope" of theater missile defense systems. Further, it explicitly pledges allegiance to the ABM Treaty as a "cornerstone of strategic stability" — code words for continuing the Cold War's mutual suicide pact into the new world disorder.

The Clinton Administration thus completely ignores the sound advice of Henry Kissinger, the principal architect of the ABM Treaty, who has written:

---

40 For example, on the one hand, the U.S. deliberated for over a year after discovering the Krasnoyarsk radar before it resolved to charge the Soviet Union with a violation of the ABM Treaty. Yet, this football field size radar — which went undiscovered for years after its construction was undertaken — was a clear, unambiguous violation. Soviet Foreign Minister Shevardnadze finally admitted as much in 1989, after five years of Soviet (and U.S. apologists') denials. On the other hand, after discovering that the Soviets had integrated their early warning radar into the Moscow ABM system, the U.S. again deliberated for over a year before it declared in the President's 1993 Report to Congress on Soviet Noncompliance (January 14, 1993) that this was not a violation. In this instance, the Soviet activities clearly exceeded the restraints that the U.S. had imposed upon its own programs to be compliant with the treaty. In this case, the U.S. simply had not taken advantage of the Treaty's ambiguities and the Soviets had. Interestingly enough, the President's report stipulated that "the U.S. Government will not consider as prohibited the handover of precise target state vectors by properly located and oriented early warning radar to ABM systems or ABM components." This precedent should provide a basis for enabling the Navy Upper Tier to "launch on remote data" and the exploitation of *Brilliant Eyes* data in providing initial targeting vectors to extend the range of missile defense interceptors. Yet, as discussed earlier, the Clinton Administration is restraining the capabilities of these systems, regressing to a position directly analogous to the prior U.S. position on early warning radar.

> A bipartisan approach is needed to come to grips with the nature of nuclear strategy in the post-Cold War world. For the end of bipolarity has also sounded the death knell to the theory of Mutual Assured Destruction, which has driven much of the debate. Devised in the late 1960s, that doctrine based security on the deliberate and agreed total vulnerability of civilian populations. The purpose was to render war so catastrophic that even the most reckless policy makers would recoil from it.
>
> But the end of the Cold War has made such a strategy largely irrelevant. Barely plausible when there was only one nuclear opponent, the theory makes no sense in a multipolar world of proliferating nuclear powers. Mutual destruction is not likely to work against religious fanatics: desperate leaders may blackmail with nuclear weapons; blackmail or accidents could run out of control. And when these dangers materialize, the refusal to have made timely provision will shake confidence in all institutions of government. At a minimum, the rudiments of a defense capable of rapid expansion should be put into place.[41]

Ironically, the Clinton Administration's seemingly blind adherence to the ABM Treaty, which is based on the theory of Mutual Assured Destruction (or MAD), is at odds with statements made by Defense Secretary William Perry. When he introduced the Clinton Administration's Nuclear Posture Review on September 20, 1995, he said his "number one priority is to put MAD behind us for good, to replace it with Mutual Assured Safety."[42]

The current negotiations should be redirected to resume the Bush Administration's discussions with Russia and others on how to build cooperatively a global protection system to protect the world community. A proposal to do this was made by President Yeltsin at the United Nations on January 31, 1992. At the same time, Yeltsin called for deeper reductions in offensive nuclear arms, leading to the START II Treaty. There is no reason now to argue that building such a missile defense system would undermine START II.

The U.S. should assert that very effective ballistic missile defenses are essential to preserving the peace in the new post-Cold War era. It should also try to persuade other nations, including Russia, that cooperation in developing and deploying missile defenses is needed to counter the ballistic missile proliferation that threatens the security of numerous regions around the world. While indicating a willingness to agree with any nation that wishes to cooperate to build and operate missile defenses as rapidly as possible, the U.S. should make clear that it will not reduce the effectiveness of either theater or strategic defenses by slavishly adhering to the constraints imposed by an outdated treaty.

---

41 Henry Kissinger, "Ready for Revitalizing," *The Washington Post*, March 9, 1995, p. A21.

42 The Department of Defense, "Remarks Prepared for Delivery By Secretary of Defense William J. Perry to The Henry L. Stimson Center," News Release No. 535-94, September 20, 1994.

RECOMMENDED PROGRAM COSTS AND SCHEDULES

Given the clear, present, and growing global threat posed by ballistic missiles, global missile defenses should be deployed as soon as technically and politically feasible. As discussed in previous sections, the most effective and cheapest approach for building the needed global defense is to deploy anti-missile defenses, first at sea, and then in space.[43] As a result of these circumstances, the U.S. should decide to:

✓ **Deploy the Navy Upper Tier and *Brilliant Eyes* as soon as possible and conduct intense SBI/SBL technology demonstration programs for two years while defining the SBI/SBL architecture.** Key elements of this program, including milestones, are summarized in Figure 4-1. These elements include the Navy Upper Tier system, the *Brilliant Eyes* sensor satellite, the Space-Based Interceptor (SBI) program, and the Space-Based Laser (SBL) program. With the recommended funding and streamlined management befitting the top national priority that should be assigned to this effort, the first operational capability can be realized as early as in late 1998, when the first AEGIS cruiser is outfitted with its Navy Upper Tier interceptors and associated radar and command and control capability. This way the first space-based sensor capability can be obtained in late 2000 (when about half of the Upper Tier production effort should be complete). The initial space-based intercept capability can be obtained as early as the year 2000.

This approach will be substantially less expensive than attempts to achieve the same effectiveness with ground-based defenses. In particular, it will be a less expensive way to defend the U.S. homeland.

As the U.S. proceeds with this acquisition strategy, the U.S. should discuss a cooperative approach with the Russians and U.S. allies. Such a cooperative approach should be patterned after Russian President Boris Yeltsin's January 1992 proposal for a joint global defense. The offer of cooperation, however, must be accompanied by a clear statement by the U.S. of its intent to proceed with the most effective global defenses permitted by modern technology. These talks should be about how to proceed, and not about whether the U.S. will or should build missile defenses.

✓ **Deploy the Navy Upper Tier system by putting 650 interceptors on 22 AEGIS cruisers.** The Navy Upper Tier system can provide the most flexible and robust theater missile defense capability in the near term. It will provide U.S. military commanders with a wide-area defense

43 The Clinton Administration has expressed its support for the Navy Lower Tier program, the Army's improved *Patriot* system, and the Army's THAAD program as core theater defense programs. The recommendations in this study will add capabilities beyond those provided by these three programs.

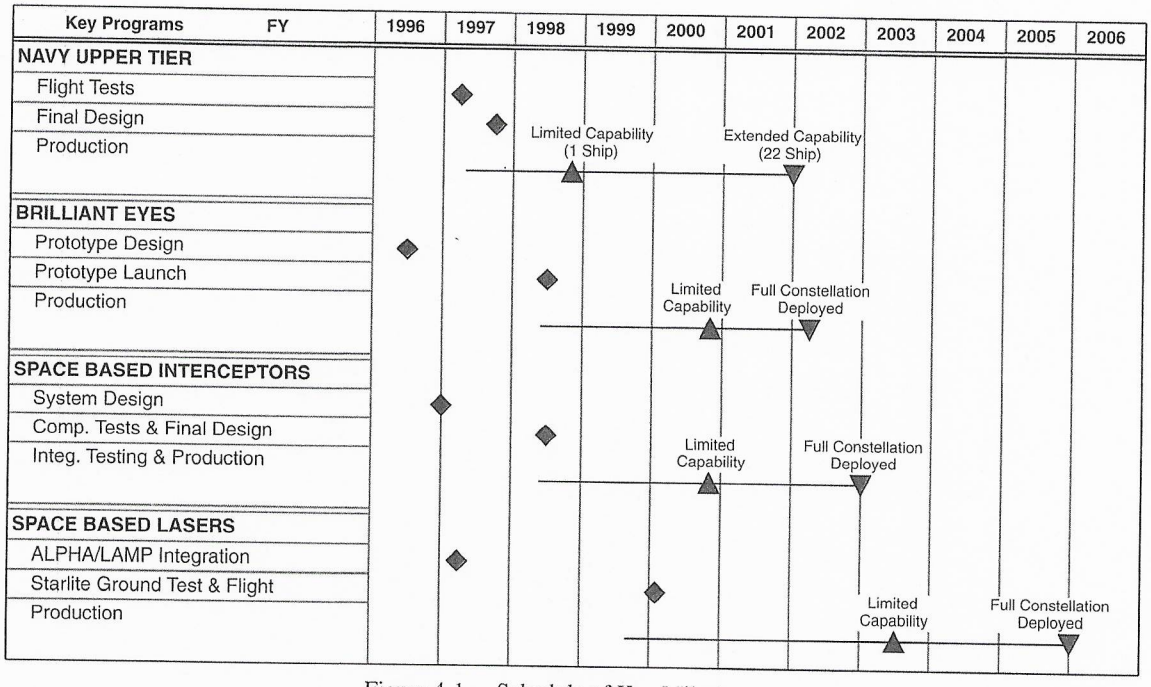


Figure 4-1. Schedule of Key Milestones

against missile attacks launched by regional adversaries. The system will also provide the foundation for a limited missile defense capability to protect U.S. territory. The ideal near-term Navy Upper Tier deployment plan will place 650 interceptors on 22 AEGIS cruisers. The initial operational capability of this system could be realized as early as late fiscal 1998. This capability could be used to defend European cities from missiles launched from North Africa or the Middle East, or Northeast Asian cities from missiles launched from North Korea. Furthermore, if current state-of-the-art sensor and command and control systems are incorporated, this system will have a limited capability to defend the U.S.[44]

This recommendation includes extending the Navy's theater missile defense program by arming the *Standard* missile Block IV with a Light-weight Exoatmospheric Advanced Projectile (LEAP) interceptor. Another very important improvement is to assure that the command and control system can fully exploit the data from external or remote sensors, including space-based sensors. Such improvements will enable the Navy Upper Tier interceptor to intercept missiles at ranges in excess of 600 miles. The required modifications for each Navy AEGIS cruiser would cost only an additional $100,000 to $200,000.

The recommended funding for the Navy Upper Tier (see Table 4-1) is believed to be sufficient for the program to proceed at a pace limited only by the time required to field the required technology. The Navy Upper Tier deployment should begin in late 1998. Congress must be vigilant in assuring that ABM Treaty concerns not limit either development or deployment of this essential capability.

---

44 As noted earlier, policy constraints to assure compliance with the ABM Treaty currently preclude giving this full capability to the Navy Upper Tier. If these constraints are not removed, the effectiveness of the Navy Upper Tier will also be limited against shorter-range "theater" missiles. In this case, a cruiser in the Sea of Japan could intercept a North Korean missile attacking Japan, but not if it is attacking the U.S. — clearly the legacy of bad policy directions.

Table 4-1. Recommended Budget for the Navy Upper Tier Program[45]

Deploy Navy Upper Tier *(millions)*	FY1996	FY1997	FY1998	FY1999	FY2000
Clinton Program	30	30	0	0	0
Team B Add-On	270	330	470	450	450
Total Needed	300	360	470	450	450

✓ **Expedite the *Brilliant Eyes* sensor satellite program.** The *Brilliant Eyes* sensor satellite will detect missile launches, track the missiles in flight, and provide important targeting data to interceptor systems. The targeting data provided by a constellation of *Brilliant Eyes* will ensure that the Navy Upper Tier system and other theater defenses will be as effective and provide as wide an area of coverage as possible. The system would include long-wave infrared (LWIR) sensors to track reentry vehicles against the background of space. This is needed to counter modern reentry vehicles.[46] This capability also will enable *Brilliant Eyes* to accomplish important space-based surveillance missions.[47]

The recommended funding (see Table 4-2) will also permit development and deployment of *Brilliant Eyes* to proceed at a pace that is not limited by funding constraints and cumbersome management procedures. For about $2 billion more than the Clinton Administration's plan during FY 1996-2000, a *Brilliant Eyes* capability can be achieved. But as with the Navy Upper Tier program, Congress must be vigilant in assuring that ABM Treaty concerns not limit the development or deployment.

Table 4-2. Recommended Budget for the Brilliant Eyes System

Deploy Brilliant Eyes *(Millions)*	FY1996	FY1997	FY1998	FY1999	FY2000
Clinton Program	120	120	120	120	120
Team B Add-On	130	180	380	830	930
Total Needed	250	300	500	950	1050

45 All the budget figures in this chapter reflecting Clinton Administration budget estimates are derived from open sources and extrapolated forward, except when definitive information was otherwise available from open sources.

46 Fielding this capability, which can be accomplished with today's technology, is being resisted by many in the arms control community precisely because it will enable *Brilliant Eyes* to track the reentry vehicles of the former Soviet Union. They allege this will give the system an ABM capability prohibited by the ABM Treaty. See footnote 40.

47 Shortfalls in the U.S. space-based surveillance capability will become increasingly important as many nations, companies, and even individuals continue to exploit advancing technology and launch into orbit satellites for their own purposes — some of which may be contrary to U.S. security interests.

✓ **Revive space-based defenses and direct the programs toward deployment.** A combination of SBIs and SBLs would provide a very effective defense against ballistic missiles with ranges greater than about 75 miles. With streamlined management and full funding, relatively inexpensive SBIs can be built within five years to begin defending the U.S., as well as its friends and allies around the world.[48] With streamlined management and full funding, SBLs, which are in the technology demonstration phase, would provide a worldwide boost-phase intercept capability by the middle of the next decade.

A major infusion of funds in the space-based interceptor and laser research and development programs is justified because both programs are actually quite mature.[49] More funds could be spent wisely to move these programs ahead even faster, but the budget-cutting mood of Congress will not permit greater spending at this time.[50] However, the resulting slower pace of development will permit experts to inform Congress — and the American people — of the effectiveness of these systems, while demonstrating the technology so that a decision on the precise architecture to be deployed may be made in 1997.

The Clinton Administration has conducted an all-out assault on the SBI program. The Clinton Administration eliminated the SBI program in 1993. In April 1994, the Pentagon's Inspector General noted that this fully approved major defense acquisition program had been managed "efficiently and cost-effectively within the funding constraints imposed by Congress" and observed that termination of key contracts "was not a reflection on the quality of program management." The management and contractor teams can be reconstituted and, with streamlined acquisition procedures, could begin fielding slow-rate production hardware by the end of this decade. The total acquisition cost for deploying and maintaining a 1,000 SBI constellation for ten years, which includes the cost of replacing each SBI once over the life of the system, would be $12 billion-$15 billion.

---

48 As contrasted with the $35 billion-$40 billion cost of a six-site ground-based national missile defense (NMD) system, *Brilliant Pebbles* could have been deployed several years sooner and operated for ten years for a total of about $12 billion, including replacing each of about 1,000 *Brilliant Pebbles* satellites over the ten-year period following full deployment. Two contractors were conducting a fully approved Demonstration and Validation Phase of the Pentagon's formal acquisition process when the program was canceled by the Clinton Administration. This space-based system would have provided a more effective NMD than six sites of ground-based interceptors, and would also have provided a worldwide theater defense capability against missiles with ranges greater than about 200-300 miles. For example, analysis of the actual data from the Gulf War has shown that such a constellation could have intercepted every Scud launched by Saddam Hussein above the Earth's atmosphere and far from its intended target.

49 The recommended Space-Based Interceptor program and associated costs were based on the approved *Brilliant Pebbles* Demonstration and Validation program that was canceled by the Clinton Administration. Therefore, there is high confidence that these estimates should be achievable within the Pentagon's acquisition process. If that process is streamlined, these costs might be reduced. The recommended Space-Based Laser program and its associated costs are based on a letter from industry to Senator Strom Thurmond. Both the program and its costs depend on a streamlined acquisition process. If the normal acquisition process is charged with executing this program, these costs are likely to grow and the schedules are likely to slip. See letter to Senator Strom Thurmond from the industrial team conducting research and development on space-based lasers. The March 14, 1995, letter was signed by Vance Coffman, President of the Space and Strategic Missiles Sector of Lockheed-Martin Corporation; Timothy W. Hannemann, Executive Vice President, Space and Electronics Group, TRW; and Edward T. Gerry, President W.J. Schafer Associates, Inc.

50 Building space-based defense is not perceived as realistic, probably because the pervasive "Star Wars" rhetoric falsely alleges such systems are possible only in the distant future. Furthermore, space-based ABM systems cannot be deployed under the terms of the ABM Treaty, and they run counter to ideological arguments about the "militarization" of space — misplaced arguments because space was militarized three decades ago. Setting the record straight will take not only an informed debate, but time.

Similarly, the space-based laser program has been proceeding for a number of years at a "dollar-limited" rather than a technology-limited pace. The recommended budget will support an on-orbit technology demonstration by the end of the decade and an operational capability by the year 2005, pending the 1997 architecture decision. SBLs, which are in the technology demonstration stage, would provide a boost-phase intercept capability against missiles with ranges greater than 75 miles. With streamlined management and full funding, a space-based prototype could be tested late in this decade and a constellation of 12 SBLs fielded by the middle of the next decade. Acquisition (including the cost of the space launcher) and a ten-year operating cost are estimated to be about $15 billion-$18 billion.

Table 4-3 summarizes the additional funding required to research and develop both the SBI program and the SBL program in advance of an architecture decision in 1997.

Table 4-3. Funding to Obtain Options for the Deployment of Space-Based Defenses

Space-Based Interceptors R&D *(Millions)*	**FY1996**	**FY1997**
Clinton Program	0	0
Team B Add-On	250	300
Total Needed	250	300
Space-Based Laser R&D		
Clinton Program	30	30
Team B Add-On	220	270
Total Needed	250	300

Table 4-4 summarizes the additional funding Team B expects will be needed following a program review in two years to determine the space-based defense architecture to be deployed. This deployment effort should proceed at a technology-limited pace. This means funding limitations and cumbersome management procedures will not delay the deployment.

Table 4-4. Funding to Deploy Space-Based Defense (Assuming a Decision on Precise Architecture in 1997)

(Millions)	**FY1998**	**FY1999**	**FY2000**
Space-Based Defenses	1,600	2,400	3,000

✓ **Reestablish a robust follow-on technologies program.** Team B recommends additional funds to restore the advanced technology programs severely cut by the Clinton Administration (see Table 4-5). These programs are needed to assure a defensive edge in the inevitable measure-countermeasure competition. Further, they represent the "seed corn" for defense technologies. The additional funding should go to re-establishing the key technology teams that worked on such programs as *Brilliant Pebbles, Raptor Talon, Clementine,* and the Miniature Sensor Technology Integration (MSTI) program. Such efforts are essential to ensuring U.S. technological superiority in these critical space and airborne sensor/interceptor technology areas.

Table 4-5. Funding to Restore the Follow-On Technologies Program

Technology Support (Millions)	FY1996	FY1997	FY1998	FY1999	FY2000
Clinton Program	93	93	93	93	93
Team B Add-On	107	107	107	107	107
Total Needed	200	200	200	200	200

✓ **Deploy missile defenses while meeting fiscal constraints.** The Clinton Administration inherited a fully funded program to develop and deploy a layered global defense. But it has cut the 1995-1999 missile defense budget by over half. The result has been to eliminate space defense deployments entirely and to slash over 25 percent from theater missile defenses, over 80 percent from ground-based U.S. homeland defenses, and over 90 percent from advanced technology programs. If these programs were restored, deployment of a sound global defense could begin around the end of the decade.

But deficit-conscious supporters of a strong defense have made it clear that the Clinton missile defense budget of about $3 billion per year will not be increased enough to make restoration of all these programs possible. Budgetary constraints make it necessary to adopt a new approach to the layered defense concept. This new approach must rely more heavily on the less expensive sea-based and space-based systems for global coverage.

Fortunately, there is a less expensive program that could allow the U.S. to begin deploying a layered defense as early as 1998, provided existing constraints on both development and deployment were removed. The most important of these constraints are those the Clinton Administration is imposing to "strengthen" the ABM Treaty. Lifting these restrictions would allow the cheaper and more effective sea-based and space-based systems to move forward. The other alternative would require the deployment of large numbers of expensive ground-based interceptors.

A sea-based and space-based system is affordable and can be fielded for less than half the budget the Bush Administration envisioned to comply with the Missile Defense Act of 1991, which directed that more expensive ground-based defenses be deployed first while retaining space-based defenses only as follow-on technologies.

The total added costs of the new programs recommended here amount to about $1 billion a year for fiscal 1996-1997, which would restore less than a third of the money the Clinton Administration cut from George Bush's last missile defense budget. Moreover, the Team B program will lead to a more effective defense years earlier than planned during the Bush Administration. Finally, deploying a sea- and space-based global defense will cost less than $25 billion over the next 15 years — substantially less than the estimated cost of the Bush Administration's Global Protection Against Limited Strikes system.

PAGE 40 IS LEFT BLANK

CONCLUSION

Ballistic missiles pose a clear, present, and growing threat to America and her allies overseas. The more ballistic missiles and nuclear weapons proliferate around the world, the more evident it will become that America and her allies need strategic defenses. The only real question is whether the nation's leadership will meet this requirement tentatively, in a piecemeal fashion, and thus more expensively, or whether it will take a more direct and ultimately cheaper path. Congress would serve the American people well by choosing the more direct route. This direct route would deploy global defenses, first at sea and then in space.

Funding this program would require the expenditure of an additional $1 billion each year for fiscal 1996 and 1997. These funds should go first to building the Navy Upper Tier interceptor system and the *Brilliant Eyes* satellite system. These programs should not be restrained from developing state-of-the-art technology because of a perceived need to comply with the ABM Treaty. These programs will provide both a robust theater defense and a limited national defense. The remaining additional funds should support robust technology demonstration programs for space-based interceptors and lasers. A decision on the combination of space-based systems to deploy — space-based interceptors and space-based lasers — should be made in 1997. Deployment of these space-based systems should begin around the end of the decade.

Finally, an aggressive diplomatic effort should be undertaken over the next two years to enlist the Russians and all others interested in defending their citizens in a cooperative effort to build a global defense. The world needs a cooperative effort to transcend rather than "strengthen" the ABM Treaty.

PAGE 42 IS LEFT BLANK

WHAT DID AMERICANS GET FOR THE $30 BILLION INVESTMENT IN SDI?

The February 15, 1995, floor debate in the U.S. House of Representatives over the National Security Revitalization Act repeatedly raised the question of what the Strategic Defense Initiative (SDI) produced for the $30-plus billion which it cost. The charge was made that since no system had been built, it would be a waste to spend more money on missile defenses. But it is the very same people who insisted on constraining SDI with the ABM Treaty and lower funding who today are complaining that the SDI program produced no tangible results. Nevertheless, their question demands an answer. The reason America remains vulnerable to missile attack today is because of a lack of political will to deploy missile defenses, and not because of a failure of SDI/BMDO management or performance by their supporting contractors.

SDI A GOOD VALUE: THREE REASONS WHY

At its inception, SDI focused on research, not acquisition. Congress obstructed SDI's attempts to establish management and support structures for a normal "system program office" that could focus on serious acquisition efforts. Progress was slowed when Congress consistently cut the SDI budget and thereby created programmatic instability. Program costs and technical risks were increased when in 1985 Congress insisted that testing be conducted according to a "narrow" interpretation of the ABM Treaty — in spite of the ambiguous treaty text and negotiating record. After four years, when in 1988 the Reagan Administration sought to transition the program into a serious acquisition phase, Congress resisted.

A serious accounting of the SDI program should begin by noting that it was initially made up almost entirely of previously existing research and development programs. As detailed in a report by two prior SDI Directors (and Team B members), about $30 billion would likely have been spent during 1984-1993 anyway on the programs that SDI incorporated.[51] New initiatives made up only about 3 percent of SDI's initial budget in 1984; some ongoing activities were later redirected by SDI as a more focused vision and system architecture emerged. The taxpayers got much more for their $30 billion than they would have without a focused, mission-oriented SDI program. There are three reasons for this conclusion:

REASON #1: SDI helped end the Cold War. Few now dispute SDI's important role in achieving this momentous event, especially given the witness of many senior Russian officials. How does one place a value on that achievement? Russian Ambassador to the U.S. Vladimir

51 James A. Abrahamson and Henry F. Cooper, *What Did We Get For Our $30-Billion Investment In SDI/BMD?* (Fairfax, Virginia: National Institute for Public Policy, 1993).

Lukin (now Chairman of the Russian State Duma's Foreign Affairs Committee) observed that SDI accelerated the end of the Cold War by at least five years. If so, over those same five years, Defense Secretary Dick Cheney's 1990 reorientation of the Cold War defense budget saved $167 billion, including $60 billion in 1994 alone.

REASON #2: The SDI program has established a management system that produced technological advancements that are benefiting both the Pentagon and the commercial sector of the economy. SDI's close coordination between technical experts and systems architects, designers, and engineers produced technological advancements sooner and for less money. For example, SDI's early focus on gaining affordable, survivable, and cost-effective space systems led to a revolution of technologies and architectures that now are being commercially exploited by the communications and remote sensing industries. Indeed, the commercial sector may benefit from these investments before the Pentagon does. Several private companies now seem likely to put systems based on SDI technologies into space before the Pentagon does.

The SDI program also pioneered the concept for streamlining and shortening the time in Pentagon acquisition programs. It was no small achievement to gain the acquisition bureaucracy's acceptance of this idea, now called the User Operational Effectiveness System concept, which will, for example, permit THAAD prototypes to be fielded in an operational configuration four to five years before fully developed hardware is produced.

SDI's management approach also established improved cost management concepts for the Pentagon. Within the SDI program itself, these concepts helped reduce by over two-thirds (from $146 billion to $41 billion in 1988 dollars) the estimated cost of a missile defense architecture. This difference compares the cost of the "Phase I" concept proposed in 1987 to that of the GPALS concept proposed in 1992. Further cost reductions would have been possible had this report's recommended "first from the sea and then from space" approach been politically acceptable.

REASON #3: The SDI program was a pioneer in developing high technology. Major technology advances in electronics, sensors and detectors, computers, propulsion, communications, and power occurred. Spin-offs are being exploited commercially by private industry.

Take, for example, the *Clementine* space probe, which employed first generation *Brilliant Pebbles* hardware. *Clementine* returned to the moon for the first time in 20 years and recorded over 2 million frames of mapping data in 11 spectral bands from the moon's entire surface. This extraordinary, prize-winning feat cost about $60 million in 18 months from concept definition to lift-off. The data it retrieved exceeded by many times that collected by the much more expensive *Apollo* program of the 1960s.

The *Clementine* space probe used and space-qualified *Brilliant Pebbles* hardware, refuting the charges that SDI systems were merely "Star Wars" fantasies. Contrary to the critics of SDI, *Clementine* demonstrated sufficiently mature technology to deploy space-based interceptors now. A fully approved Demonstration and Validation program was developing the next generation technology, consistent with the Missile Defense Act of 1991, before the Clinton Administration terminated the effort.

HOW SDI ADVANCED TECHNOLOGY

The House floor debate on the National Security Revitalization Act included many mischaracterizations of SDI, alleging a great waste of money on supposedly fanciful programs. The "Star Wars" caricature usually referred to space-based defenses — in spite of the fact that more than half of the $30 billion referred to in the debate was spent on ground-based defenses. Favorite

whipping boys in Congress and elsewhere are the x-ray laser and *Brilliant Pebbles*, the latter of which was falsely alleged to be enormously expensive and less mature than ground-based interceptor systems.

To help set the record straight, consider the five technology sectors where the $30 billion was spent during SDI's ten years from 1983 through 1992:

Directed Energy Programs. Without debating whether the technical properties of the x-ray laser have merit (they do), it is important to understand that Ronald Reagan's explicit instructions were that SDI not involve nuclear weaponry. Nuclear weaponry would have been necessary for the x-ray laser. SDI investigations of the x-ray laser, which cost less than 0.2 percent of SDI's funds between 1983 and 1992, focused on survivability. U.S. defense leaders were concerned that Soviet research on x-ray lasers might someday challenge SDI non-nuclear systems. It is remarkable that so much attention and media hype has been given to such a minor aspect of the SDI program.

Contrary to common perception, substantial strides were made throughout the ten-year period with all directed energy programs, which amounted to 20 percent-25 percent of SDI's research and development funds. Directed energy technology developments in the optics and atmospheric compensation areas have been of acknowledged value to other defense applications and to the space community. Since the peak funding year in 1988, when directed energy programs composed almost 30 percent of the SDI budget, the Directed Energy budget has shrunk to where it now composes about 1 percent of BMDO's budget. For the past five years, the nation's total annual investment in this important technological area has been less than existed before the advent of SDI. It is now lower than any time in the past 20 years.

In spite of the "Star Wars" imagery, this technological area has steadily matured. For example, with a streamlined acquisition program, with the necessary funding of $12 billion-$15 billion (roughly the amount the government could raise by selling the Strategic Petroleum Reserve), the U.S. could deploy space-based chemical lasers within the next ten years. Such a system could intercept ballistic missiles of all ranges greater than about 75 miles, and it could do so while they are rising from their launchers and before they could release multiple bomblets that would be difficult to defeat with other defenses.[52]

Kinetic Energy Programs. Even more readily available are the kinetic energy or "hit-to-kill" technologies, in which SDI invested about 25 percent of its funds during 1983-1992. Ongoing programs such as THAAD, ERINT/PAC(3), and Navy Upper Tier are exploiting these technologies.

The technology has flowed from space to the ground, not the other way around. This misperception was used as an excuse by Congress in 1991 to slow development of the space-based *Brilliant Pebbles*, which could have been deployed well before the end of this decade for a third the price of THAAD. This system alone could defend the entire United States and U.S. overseas troops, friends, and allies against limited ballistic missile attacks. Before the Clinton Administration terminated the *Brilliant Pebbles* program in 1993, less than 3 percent of SDI total funds had been invested in this the most innovative and cost-effective SDI program.

---

52 The need for boost-phase intercept capability was given a top priority in the Clinton Administration's May 1994 *Report to Congress on Non-Proliferation and Counter-Proliferation Activities and Programs*. Yet space-based lasers are barely being sustained at a subcritical funding level.

Sensor Systems. Just over 25 percent of the total SDI investment during 1983-1992 was in sensors. Every SDI sensor program, save one, is still moving toward deployment. The only impediment is the shortage of funds. The investment in space-based sensors was about twice that in ground-based sensors. The resulting technological innovations could revolutionize future space system architectures for both commercial and military applications. Within the foreseeable future, tiny sensor satellites based on SDI-pioneered technologies and weighing a few pounds could be placed in low-Earth orbit with relatively unsophisticated, inexpensive boosters. Corporations will soon be able to afford to launch systems for their own purposes and profit.

The profound implications of these developments have not been appreciated by those who argue nothing of consequence came from SDI. Regrettably, the bureaucratic inertia of the Pentagon practically assures that the U.S. armed forces will be among the last to benefit. There will be even more profound implications if other nations harness these developments to exploit military advantages of space before the United States.

Key Technologies. During 1983-1992, nearly 10 percent of SDI's funds were spent studying the survivability of defensive systems, the lethality of SDI interceptors, advanced power sources for SDI sensors and weapons, less expensive launch capabilities, innovative science and technology, advanced materials, and countermeasures. These investments convinced Pentagon planners that both theater and U.S. homeland defenses could effectively deal with countermeasures intending to foil strategic defenses.[53]

System Engineering and Integration. System engineering and integration absorbed around 15 percent of SDI's investments during 1983-1992. This substantial percentage is consistent with the precedent established by other Pentagon acquisition programs. It can be criticized only by those who are not serious about acquiring missile defense systems. This investment enabled the innovation and rapid exploitation of advancing technology that permitted the $100 billion reduction in the estimated cost of SDI system architectures between 1987 and 1992.

POLITICAL WILL IS THE ISSUE, NOT TECHNOLOGY

It should be clear that the money spent on SDI/BMD can be well justified. Acquisition programs now being pursued by the Clinton Administration have their roots in research and development that predated the advent of SDI, and all of them benefited from SDI's stewardship.

SDI was not a wasteful "boondoggle"; $30 billion was not wasted, or even spent, on some space-based "Star Wars" fantasy; and defenses for the American people and our overseas troops, friends, and allies are not unaffordable — indeed, they can be built beginning before the end of this decade for an annual investment much less than the Defense Department has been spending on non-defense programs. However, if this is to be accomplished, the trend of the past two years must be reversed, and Congress must restore several programs curtailed or terminated by the Clinton Administration. As noted above, these programs had been endorsed by Congress in the FY 1993 Defense Authorization Act.

In effect, the decade between 1983 and 1992 provided a mature technological and programmatic basis for deploying effective defenses and, in another decade, such defenses would have been in place. However, the Clinton Administration chose not to implement this program, in spite of its maturity and bipartisan congressional support. Rather, it cut the planned SDI budget

53 Major cuts in these programs during the past two years cast doubts on whether this is still true.

became an arms control touchstone, the ABM Treaty. Henry Kissinger, the architect of the ABM Treaty, in a March 9, 1995, *Washington Post* Op-Ed observed that this Mutual Assured Destruction (MAD) strategy is "largely irrelevant." He noted that when religious and other fanatics seek to intimidate or blackmail the U.S., "the refusal to have made timely provision will shake confidence in all institutions of government." Kissinger concluded that "at a minimum, the rudiments of a defense system capable of rapid expansion should be put into place."

In the strongest terms, Team B urges Congress to block the Administration's misguided efforts to "dumb down" theater defenses for U.S. troops, friends, and allies. The American people should not be held hostage to a slavish adherence to an arms control treaty that was always of doubtful value. If freed from these ideological constraints, America's industry can exploit the investments of the past twelve years and provide effective defenses by the end of this decade.

SELECTED HERITAGE FOUNDATION POLICY STUDIES

Rolling Back Government: A Budget Plan to Rebuild America
Edited by Scott A. Hodge
(1995, paperback $20.00)

Red Tape in America: Stories from the Front Line
by Craig E. Richardson and Geoff C. Ziebart
(1995, paperback $14.95)

The Index of Economic Freedom
by Bryan T. Johnson and Thomas P. Sheehy
(1995, paperback $18.95)

Issues '94: The Candidate's Briefing Book
(1994, paperback $18.95)

1995-1996 Guide to Public Policy Experts
Edited by Thomas C. Atwood
(1995, paperback $16.95)

The Ruling Class: Inside the Imperial Congress
by Eric Felten
(1993, cloth $24.00)

For a Publications Catalog — or to order any of the above — contact:

The Publications Department
The Heritage Foundation
214 Massachusetts Avenue, N.E.
Washington, D.C. 20002-4999
1-800-544-4843

SPECIAL NOTE TO COMPUSERVE SUBSCRIBERS

All Heritage Foundation studies are available on line as part of the Town Hall forum. A joint project of The Heritage Foundation and National Review, Town Hall is a meeting place for conservatives to exchange information and opinions on a wide variety of subjects.

For more information online, type **GO TOWNHALL**, or call 1-800-441-4142.