

Chapter One

Overview: Desirability and Feasibility of Ballistic Missile Defenses

Steven Fetter

School of Public Affairs, University of Maryland [1](#).

King Solomon lamented in Ecclesiastes that there is nothing new under the sun. The current dispute over the desirability and feasibility of missile defenses is just the most recent in a long series of debates that began in late 1950s. It is inevitable that ballistic missiles would stimulate a search for missile defenses; every offensive weapon has spurred the creation of a defensive weapon to counter it. For many people, the analysis is simple: if missile defenses are feasible, then they are desirable. After all, how can responsible leaders choose not to defend their country from attack if it is within their means and ability to do so?

The analysis is not that simple, of course. Deciding whether and what type of ballistic missile defense makes sense requires a detailed tradeoff analysis, where we compare the hoped for benefits of deploying a particular type of missile defense against the likely costs we incur in doing so.

The benefits of a missile defense derive from the likelihood that such a system might deter or partially protect against attacks on the United States, its allies, or its troops. We might measure the benefits in the expected number of lives saved. There are also other, more indirect benefits. For example, Patriot may not have destroyed a single missile over Israel, but it helped the United States maintain its Gulf War alliance by helping to keep Israel out of the war. Of course, it is hard to generalize from this experience; once you know that a defense is ineffective, it loses its psychological power. And if the missiles had been armed with chemical, biological, or nuclear weapons, the ineffectiveness of Patriot would have been only too obvious.

What are the costs of defense? There is, of course, an economic cost measured in at least the tens of billions of dollars. In an era of declining defense budgets, ten billion dollars spent on missile defense is ten billion dollars that could have been spent on fighter aircraft, precision munitions, cargo planes and ships, intelligence gathering, and soldiers.

There are also other costs, more subtle and harder to measure. Perhaps the most important have to do with how other countries react to the deployment of missile defenses by the United States.

The Threat

An assessment of the desirability and feasibility of ballistic missile defense must begin with the nature of the threat posed by missiles to the United States, its allies, and its military forces deployed overseas. There are two classes of threats that concern us.

The first class of threat emanates from North Korea, Iraq, Iran, and other possible "rogue" states. The ballistic missiles now fielded by such countries have ranges less than 600 kilometers (360 miles), and may

pose a threat to US allies and military forces. Most are armed with conventional high-explosive warheads, but chemical or even biological or nuclear warheads might be deployed in the future. Some people believe that these countries might build or buy missiles capable of reaching the US homeland, but these fears are greatly exaggerated.

The second class of threat is the possibility that a small number of Russian missiles might be launched at the United States accidentally or without authorization. However, some analysts believe that the probability of an accidental, inadvertent, or unauthorized launch, which might involve a handful of Russian missiles, is significant and increasing. The United States might also wish to defend against deliberate attacks from China, which would involve a small number of missiles.

A third class of threat, a deliberate attack by Russia, is considered extremely unlikely today, and it is highly unlikely that we could build a defensive system that would be effective against a massive attack in any case.

Missile Threats from "Rogue" Nations

The oft-repeated statement that "at least twenty countries already have or may be developing ballistic missiles" does not shed much light on the problem. We need to know which potentially hostile nations have or might have missiles, the ranges of those missiles, and the nature of the warheads that they may be armed with.

Many of the nations that have missiles (Israel, India, Pakistan, Saudi Arabia, South Korea, Taiwan, Egypt, and Kuwait) along with several that are capable of building missiles (Brazil, Argentina, and South Africa) are very unlikely to threaten US interests. A number of somewhat less-friendly nations, such as Afghanistan, Algeria, Cuba, and Yemen, have only short-range, conventionally-armed missiles that do not pose a threat to US allies or troops, and are unable to build or buy longer-range missiles or unconventional warheads. When we subtract these nations from the list of countries that have or are trying to acquire missiles, we find that the list of countries that we are really worried about is very short indeed: North Korea, Iraq, Iran, Libya, and Syria. According to a recent US National Intelligence Estimate, none of these countries is likely to build or otherwise acquire a ballistic missile capable of reaching the continental United States within the next 15 years. ([See Appendix B.](#)) Thus, the missile proliferation threat which the United States must act upon today boils down to five states that might use missiles to threaten US allies and troops stationed abroad. [2.](#)

When considering this threat, we should remember that a missile by itself is not a weapon; it is the warhead on top of the missile that concerns us. To date, all of the missiles used in war have been armed with conventional high-explosive warheads, and these pose little threat to US military forces. Conventionally-armed ballistic missiles are useless against mobile and hardened targets, and are only a nuisance against soft, fixed targets like airfields and ports. Even as terror weapons against cities they are remarkably inefficient. The eleven Iraqi Scuds launched at Israeli cities before the deployment of Patriot resulted in no deaths or severe injuries. The 27 launched after Patriot was deployed resulted in two deaths and one severe injury.

At the other end of the spectrum are nuclear warheads, which are extremely worrisome. Fortunately, nuclear nonproliferation efforts have generally been very successful, and with the possible exception of North Korea (whose nuclear program is frozen and under international monitoring), none of the countries that we are worried about are likely to have them in the foreseeable future.

Somewhere between conventional and nuclear weapons stand chemical and biological weapons. A number of countries have produced chemical agents and may have produced chemical warheads for missiles. US troops are well-trained and equipped to deal with chemical attacks; attacks on cities could be expected to produce mass panic, but probably not massive casualties. Biological warheads have the potential to be far more deadly for unprotected civilians, if the biological agents could be dispersed in an efficient manner. Although a few countries are thought to have produced biological agents, and Iraq has stated that it loaded four Scud warheads with anthrax spores, no country is known to stockpile an effective biological warhead.



Thus, we are most concerned with having a defense against chemical, biological, or nuclear weapons, not missiles per se. Furthermore, missiles are only one way and perhaps not the most likely way that these weapons would be delivered. A country like North Korea, which has at most one or two nuclear devices, may be reluctant or unable to mount them on missiles. Missiles are relatively unreliable, and they place limits on warhead weight, diameter, and safety that a primitive nuclear device may not be able to meet. Missiles are also one of the least desirable ways to disperse chemical

or biological agents; a cruise missile, airplane, or special operations forces would be much more efficient. So even if we were able to deploy an effective missile defense, that doesn't necessarily mean we would be able to protect our allies or troops from attack. Indeed, the very act of deploying a missile defense would encourage adversaries to use other means of delivery.

Finally, the type of interceptors currently under discussion, which must hit warheads in order to destroy them, are suitable only for a defense against unitary warheads: nuclear warheads, large high-explosive warheads, and bulk-filled chemical and biological warheads. Except for nuclear weapons, this kill mechanism can be defeated by using submunitions that are released soon after the end of the boost phase. In fact, submunitions are the preferred way to deliver chemical and biological weapons on cities, where the object is to disperse the agent over a wide area. The chemical warheads developed by the United States for the Little John, Honest John, and Sergeant missiles carried hundreds of bomblets. Submunitions would be well within the technical capability of a country that could produce ballistic missiles; indeed, they would be easier to develop than a mechanism to disperse chemical or biological agents near ground level from a unitary warhead traveling kilometers per second.

States of Proliferation Concern

As noted above, the list of countries that pose a real and present missile threat is rather short. In each case, the threat is not to the territory of the United States, but to US allies and US troops stationed abroad. This missile threat can, however, have important consequences for regional security in areas of the world where the United States has security commitments and vital interests, such as East Asia, the Middle East, and

Europe.

A summary of the missile threat from these nations is presented below. [Chapter Two](#) provides a detailed examinations of these programs.

The Missile Threats in Brief

The rogue-state missile threat to US interests over the next few years consists of:

- North Korean missiles armed with conventional and chemical warheads aimed at South Korean and Japanese cities and at US forces stationed in South Korea and Japan;

Iranian missiles armed with conventional and chemical warheads aimed at Saudi or Turkish cities, or at US forces stationed in Turkey and Saudi Arabia; and,

Syrian missiles armed with conventional and chemical warheads aimed at Israeli or Turkish cities, or at US forces stationed in Turkey.

Within 10-15 years, this threat could expand in the following ways:

- North Korea could break out of its agreement with the United States and develop nuclear weapons;

North Korea, after further testing and development, could produce and sell the Nodong missile to Iran, Syria, or Libya. This would allow Iran to reach Israel; Syria to reach Greece; and Libya to reach Italy or Greece;

North Korea could (improbably) develop and sell 2,000-3,000-km-range missiles to the same list of countries, who could use them to threaten much of Western Europe;

Finally, Iraq might break free of international sanctions and international monitoring and revive its programs to develop missiles and weapons of mass destruction.
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An Appropriate Response

What is an appropriate response to this threat? Certainly it would be good to have a defensive system capable of intercepting missiles with ranges up to 600 kilometers that are armed with conventional or chemical warheads. It also would be prudent to have systems capable of intercepting similarly-armed 1000-km-range missiles, in case North Korea deploys or sells the Nodong missile. At the same time, we should realize that deploying a missile defense would not necessarily protect allied cities or US forces abroad. Even if it was highly effective against unitary warheads, submunitions and other countermeasures would defeat the system. In addition, deploying a missile defense would provide further impetus for countries to explore other means of delivery, such as airplanes, cruise missiles, mini-sub, and special forces or other unconventional means.

Looking to the future, it is difficult to say what sort of system would represent a prudent insurance policy, because it mostly depends on how likely it is that North Korea will develop and sell longer-range missiles. Given that North Korea is on its knees economically, that it has no military use for longer-range missiles, and that it is trying to improve relations with the United States, it is unlikely that this will happen. Nor is it likely that any other country will emerge as a supplier of long-range missiles to "rogue" states, either. Nevertheless, some people believe that it is prudent to develop defenses against missiles with ranges up to 3,000 kilometers or so, which is basically what the Army's Theater High Altitude Area Defense (THAAD) is trying to do. These are "theater" missiles, or intermediate-range missiles between the Scuds and inter-continental-range missiles.

But decisions about theater missile defenses must take into account the reactions of Russia, China and other countries--reactions that could have negative consequences for the security of the United States and its allies. The deployment of highly capable theater defenses might, for example, prompt Russia to scrap the START-II treaty, or China to expand its arsenal of nuclear-armed missiles. For this reason, we should make every effort to reach agreement with Russia and China on the nature and level of missile defenses that would not trigger such reactions. If such an agreement was not possible, the United States and its allies would have to decide whether the likely benefits would outweigh the likely costs. In other words, would deploying a missile defense reduce, on balance, nuclear dangers? In today's international environment, the answer is clearly "no." ([See Chapter Five.](#))

Missile defense is only one way to reduce the risks of missile proliferation. The Missile Technology Control Regime (MTCR) and related export controls have been surprisingly effective at reducing the scope of the potential problem, compared to what might have been expected five or ten years ago. The experience in handling Chinese missile exports and the North Korean nuclear problem gives some hope that even the most troubling missile programs might have diplomatic solutions. Even if we can't prevent the development or sale of missiles to potential adversaries, "passive" defenses (such as dispersal of troops, protective clothing and civil defense) can be over 90 percent effective at preventing casualties from chemical and biological weapons level of protection that would be difficult to achieve with active defenses. There is also some hope that the Air Force can improve its ability to destroy launchers, in part because longer-range missiles require launchers that are much larger, more distinctive, and more difficult to hide than the Scud launchers that Iraq used. Finally, the fact that Iraq did not use chemical weapons during the Gulf War, despite the fact that it had chemical warheads for the Scud, shows that the use of unconventional warheads can be deterred even if a country is losing a war. In short, it simply is not true that we are helpless if we do not have theater missile defense. (See Chapters [Three](#) and [Four](#).)

Accidental or Unauthorized Launch

What about missile defenses to counter the threat of accidental or unauthorized launches from Russia or China? This was the main rationale for the Global Protection Against Limited Attack System (GPALS) proposed by President George Bush and the Accidental Launch Protection System (ALPS) proposed by Senator Sam Nunn some years ago. The Missile Defense Act of 1991 called for "a highly effective defense of the United States against limited ballistic missile threats, including accidental or unauthorized launches..." This threat has also been cited in recent legislation by those who support a national missile defense. The threat of accidental or unauthorized launch is real. Although it has been with us for some time, there are reasons to be more worried today: in particular, the political instability of Russia, in which coup d'etat, anarchy, or civil war are real possibilities. This is a legitimate concern worth insuring against, and a missile defense could be part of an insurance policy. ([See Chapter Two, Part B.](#))

There are two approaches to designing a defense against limited missile attacks from Russia or China. One approach is to deploy a land-based defense within the bounds of the Anti-Ballistic Missile (ABM) Treaty, with no more than 100 interceptors based at the site of the old Safeguard ABM system near Grand Forks, North Dakota. Another approach is to go beyond the bounds of the ABM Treaty and deploy interceptors at several sites, advanced space-based systems to provide accurate tracking data, and perhaps supplement this with air-, sea- or space-based interceptors to destroy missiles in their boost phase.

ABM-treaty-compliant System

The ABM Treaty is central to debates about national missile defense. The purpose of the Treaty is stated in the Preamble: "Effective measures to limit anti-ballistic missile systems would be a substantial factor in curbing the race in strategic offensive arms and would lead to a decrease in the risk of outbreak of war, " and "would contribute to the creation of more favorable conditions for further negotiations on limiting strategic arms." This argument -- that limits on defenses are needed to permit reductions in offensive weapons -- is still relevant today. Thus, Presidents Clinton and Yeltsin have agreed that the ABM Treaty is "a cornerstone of strategic stability," and the administration has tried to keep its program consistent with the treaty.

Recently, Lt. Gen. Jay Garner, Commander of the Army Space and Strategic Defense Command, has said that it would be possible to deploy a highly effective, Treaty-compliant NMD that covers all 50 states. There are three obstacles to this approach.

Due to the curvature of the Earth, it is impossible for the radars of a single-site system to provide coverage of the 48 contiguous United States, much less cover Alaska and Hawaii. [3](#). Any defense capable of covering the entire United States will at a minimum require deploying sensors for interceptor guidance at multiple locations, and this is banned by the Treaty.

A single-site system could not protect the entire United States from submarines off the US coast. Six of the ten largest US cities are more than 2,000 kilometers from Grand Forks, and Miami is 3,000 km away. It would be physically impossible for interceptors launched from Grand Forks to intercept SLBMs launched 2000-3000 km off US coastlines, particularly if the missiles were launched on depressed trajectories. And a system at Grand Forks would be farther from Anchorage and Honolulu than Russian submarines based in the Sea of Okhotsk, so it could not protect these cities from accidental or unauthorized SLBM launches even from Russian ports.

A system that tried to defend the entire United States against even limited attacks would probably violate the ABM Treaty. Article I of the Treaty states that "each party undertakes not to deploy ABM systems for a defense of the territory of its country and not to provide a base for such a defense, and not to deploy ABM systems for the defense of an individual region except as provided for in Article III of this Treaty." Expanding such a system to defend against much larger attacks could be straightforward, requiring only the deployment of additional interceptors. In fact, one concept for nationwide defense would use Minuteman missiles, of which the United States already has one thousand deployed. By contrast, the single-site Safeguard and Galosh systems built in the 1970s under the ABM Treaty could defend only a fraction of their respective countries. More than a dozen Safeguard sites, each with its own large radar, would have been required to defend the entire United States, an expansion that would have involved a costly, visible, and time-consuming construction program.

Non-treaty-compliant System

If we are serious about trying to provide an effective nationwide defense against small Russian or Chinese attacks, all the constraints of the ABM Treaty would have to be lifted. We would have a much better chance of mounting an effective defense with a multi-site system, supplemented by sophisticated space-based tracking systems, and perhaps by some sort of system to intercept missiles in their boost phase. The GPALS system, which was to include 1000 ground-based interceptors at five sites and 1000 orbiting "Brilliant Pebbles" interceptors, is an example of a more serious approach to the problem.

However, any defense that would be capable of effectively defending the United States from a small attack would throw Russia's second-strike capability into doubt, especially at or below START-II force levels. Added to Russian concerns would be the potential for rapid expansion of the defense.

Russia has already given indications of how it would respond to the deployment of a nationwide missile defense when Moscow conditioned the ratification of START I on continued US compliance with the ABM Treaty. It would be relatively cheap and easy for Russia to maintain MIRVed ICBMs. Alert levels could be increased, supplemented by plans to launch silo-based ICBMs and pier-side SLBMs upon warning of attack. This would increase the risk of accidental or unauthorized attack. Russia could deploy relatively cheap countermeasures, such as depressed trajectories, penetration aids, and decoys to degrade the effectiveness of a US defense.

Meanwhile, the collapse of START and the ABM Treaty could fuel nationalist sentiment in Russia, upsetting Russian politics and increasing the risk of accidental or unauthorized launch. A nationwide defense against small attacks would, of course, threaten the effectiveness of China's small strategic nuclear force. In the absence of prior agreement with China, Beijing could respond with defensive countermeasures and a significant expansion of its forces, which would increase the perceived threat to the United States, Russia, and perhaps India. If Russia chose to deploy a missile defense, the United Kingdom and France would face a similar decision to expand their forces. In short, deploying missile defenses outside the bounds of the ABM Treaty and without agreements with Russia and China could ruin prospects for reductions. This would consign future generations to live in a world of thousands of nuclear warheads.

Congress had these types of reactions in mind in the Missile Defense Act of 1991, which called for "a highly effective defense of the United States against limited ballistic missile threats...but below a threshold that would bring into question strategic stability." In today's international environment, this probably is not possible. If we unilaterally dispense with the ABM Treaty and deploy a nationwide defense, we are likely to end up with the worst of both worlds: we will trigger Russian reactions that will put an end to nuclear reductions and other cooperative efforts to reduce nuclear risks and may even increase these risks while failing to provide a really effective defense against even limited missile attacks.

Fortunately, there are other ways to decrease the risk of attacks against the United States. The most straightforward is to implement the START I and START II reductions in the number of missiles and warheads and to pursue additional reductions down to less than 1000 warheads on each side. This could be done faster than an effective defense could be built, and it would save, not spend, tens of billions of dollars. Even more important would be reducing the alert level of nuclear forces, so that missiles are no longer poised for quick attack during peacetime. The risk of accidental and unauthorized attacks can also be reduced through other cooperative measures and better use controls. All of these measures could be pursued in a cooperative security environment. Deploying nationwide defenses in violation of the ABM Treaty

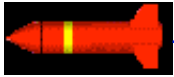
would make most of these measures impossible, and would breed suspicion, competition, and hostility rather than cooperation.

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- 1. This chapter is adapted from a speech by the author given recently before the American Association for the Advancement of Science in Washington, DC.
 - 2. A possible exception is North Korea, which might develop a 3500 kilometer range missile capable of reaching uninhabited parts of Alaska (westernmost Aleutian Islands). The closest US city, Anchorage, is 6000 kilometers from North Korea, which would require near-ICBM capability.
 - 3. For proof of this fact, see L. Gronlund and D.C. Wright, "Limits on the Coverage of a Treaty Compliant ABM System," *Physics and Society*, April 1992, pp. 3-6.

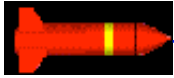
Photo: A soldier in training during a field exercise, from Company C, 82nd Chemical Battalion, Ft. McClellan, AL.

US Army photo by Sgt. Donna A. Perkins, Ft. McClellan Public Affairs Office.

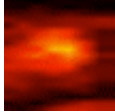
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