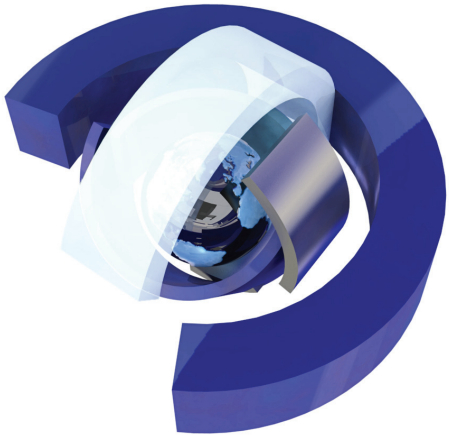
Frequently Asked Questions



A Guide

Independent Working Group

about Ballistic Missile Defense

This Guide is based on information contained in the 2009 Independent Working Group Report entitled *Missile Defense, the Space Relationship, and the Twenty-First Century* which can be downloaded at www.ifpa.org. The purpose of the Guide is to address the most often asked questions and to provide information about missile defense.

question 1

What is Ballistic Missile Defense?

A ballistic missile defense system detects, tracks, intercepts and destroys incoming ballistic missiles and/or their warhead payloads. A fully operational defense consists of sensors to detect a missile launch and to track the missile and warhead; interceptors to disable or destroy the missile or warhead; and a command and control system. A ballistic missile and/or its warhead can be destroyed by an interceptor's fragmentation warhead that explodes in its vicinity or by more modern "hit-to-kill," direct impact technologies—i.e., by "hitting a bullet with a bullet." Both types of intercept are known as "kinetic kill." Work is also progressing on directed energy technologies such as lasers, which can destroy a missile and its warhead at the speed of light.

Missile defense systems can be deployed on the ground, in the air, at sea, or in space and destroy missiles and their payloads during their three stages of flight: i.e., the boost, midcourse, and terminal phase. In the boost phase just after launch, the missile is especially vulnerable because it is relatively slow moving and it emits bright exhaust gases that are comparatively easy for sensors to detect and track. Interception during the boost phase has the advantage of destroying the missile before it disperses its payload, which may consist of one or more warheads and countermeasures in the form of decoys. Intercepting a missile in boost phase has the additional advantage that the debris, including warheads, may, depending on how early interdiction occurs, fall on the country launching the missile—a reality that could have a deterrent effect if the launching state is faced with the likelihood of serious damage to its own territory. The duration of the boost phase for medium- and short-range missiles is a couple of minutes; for intercontinental range ballistic missiles (ICBMs) it is three to five minutes. In general, space-based interceptors provide the best opportunities for boost-phase intercepts.

The midcourse phase provides a longer timeframe for interception. This phase accounts for as much as eighty percent of the payload's flight time—some twenty minutes for the longest-range missiles—therefore offering multiple intercept opportunities. Midcourse interception may require that the missile defense system distinguish between warheads and decoys, the latter being released in order to confuse sensors and waste interceptors against a false target. During the terminal phase the payload reenters the Earth's atmosphere creating a bright infrared signature and the decoys slow down considerably because they are likely to be lighter than warheads. Under these conditions, warheads may be distinguished more easily permitting the defense to launch interceptors against the exposed warheads.

Why do we need missile defense?

question 2

Missile threats emanate from across the globe and in various forms. North Korea has hundreds of short- and medium-range ballistic missiles threatening South Korea and the U.S. forces deployed there and throughout the region. It is also developing long-range ballistic missiles, and now has several nuclear weapons—and is building more. Iran has a large and growing ballistic missile inventory and is developing a nuclear weapons capability. Both nations are hostile to the United States. The willingness of North Korea, Iran, and even China and Russia, to proliferate missile and nuclear technologies raises further the likelihood that nuclear weapons and their delivery systems could fall into the hands of additional states and/or terrorist groups.

In fact, nuclear weapons are already in the inventory of states such as Pakistan that could be infiltrated—and in a worst case situation—their governments overthrown by groups such as Al Qaeda and the Taliban, calling into question who would control that country's nuclear arsenal. Moreover, Pakistan was at the center of a vast proliferation network that was headed by A.Q. Khan, the architect of the Pakistani nuclear weapon program who later sold nuclear weapon expertise and hardware to terrorist sponsoring countries, including Libya, Iran, and North Korea. There is a legitimate concern that the Khan nuclear network could be revived under certain scenarios, further exacerbating the proliferation of nuclear weapons, technologies, and knowhow.

Iran's acquisition of a nuclear weapon could produce a "cascading" proliferation effect where other states in the region such as Saudi Arabia and Egypt seek their own nuclear capability as a result. Such an occurrence could have dire consequences for the United States because these countries have terrorists and other groups within them that are openly hostile to America.

There also is a potentially grave threat from an electromagnetic pulse (EMP) attack delivered by relatively unsophisticated ballistic missiles. EMP is generated by any nuclear weapon burst at altitudes above a few dozen kilometers and results in the destruction of electronic systems such as those found in U.S. energy and telecommunications networks, transportation systems, throughout our manufacturing sector, and in our food processing and distribution system. The destruction and chaos caused by an EMP explosion would be substantial today given the reliance of the United States on electronics in its critical infrastructure. Several potential enemies already have, or could soon acquire, an EMP capability. A single weapon exploded over the center of the United States could produce disastrous damage affecting the entire country. The devastating and lasting consequences of an EMP attack are depicted in great detail in William Forstchen's recent novel, *One Second After*.

In addition, ballistic missile threats confronting the United States are not limited to intercontinental-range missiles. Short-range ballistic missiles (SRBMs) can be launched at the United States from ships off our shores or targeted on forward deployed U.S. forces. Iran reportedly has tested short-range ballistic missiles from a ship in a way that suggests they are working to achieve an EMP capability. Nuclear-armed terrorists, who could purchase a SRBM for a few million dollars, could also launch an EMP attack. Meanwhile, China and Russia, strategic competitors of the United States, continue to develop new and sophisticated strategic systems as part of their respective military modernization programs, even though our current limited missile defenses are not designed to defend against a major nuclear attack (see next two Questions). These current and expanding ballistic missile/nuclear threats are why the United States needs to have a robust missile defense.

question 3

Don't we already have missile defense?

Yes, the United States does presently have a missile defense, albeit a limited one. One component is called the Ground-Based Midcourse Defense (GMD). It consists of ground-based interceptor missiles (GBIs) deployed in Alaska and California and a battle management, command and control system. However, even after deployment of the planned total of 30 GBIs, it will be capable of intercepting only a few hostile warheads. The United States also operates the Theater High Altitude Defense (THAAD), and the *Patriot* Advanced Capability (PAC-3) systems. Both are ground-based and transportable, with THAAD designed to intercept and destroy ballistic missile payloads inside or just outside the atmosphere during the early-terminal, late-midcourse phase of flight, while the PAC-3 would interdict warheads in the late-terminal phase.

By the close of 2010, the U.S. Navy is expected to have 21 ships equipped with the *Aegis* Ballistic Missile Defense (BMD) system capable of intercepting short-, medium- and intermediate-range missiles in the terminal and in the midcourse phase with the *Standard* missile and its variants. Dozens more ships in the U.S. Navy's fleet could be outfitted with *Aegis* BMD. With an upgraded *Standard* missile, Aegis BMD combatants would be able to intercept longer-range ballistic missiles in their boost stage. In addition, the *Aegis* system could be given the technological capability to destroy missiles launched from ships off our shores. This would be an important step to counter the EMP threat described in Question 2. Furthermore, the United States is proceeding with a new missile defense program called the Phased Adaptive Approach or PAA in Europe to defend against the growing ballistic missile threat from Iran. The PAA entails deployments of *Aegis* BMD/*Standard* missile (in the Mediterranean Sea) and a land-based version called *Aegis* Ashore.

The 2011 defense budget request contains approximately $10 billion for missile defense with increased allocations for *Aegis* BMD. However, this budget and funded programs still fall far short of what is required for a robust, layered defense.

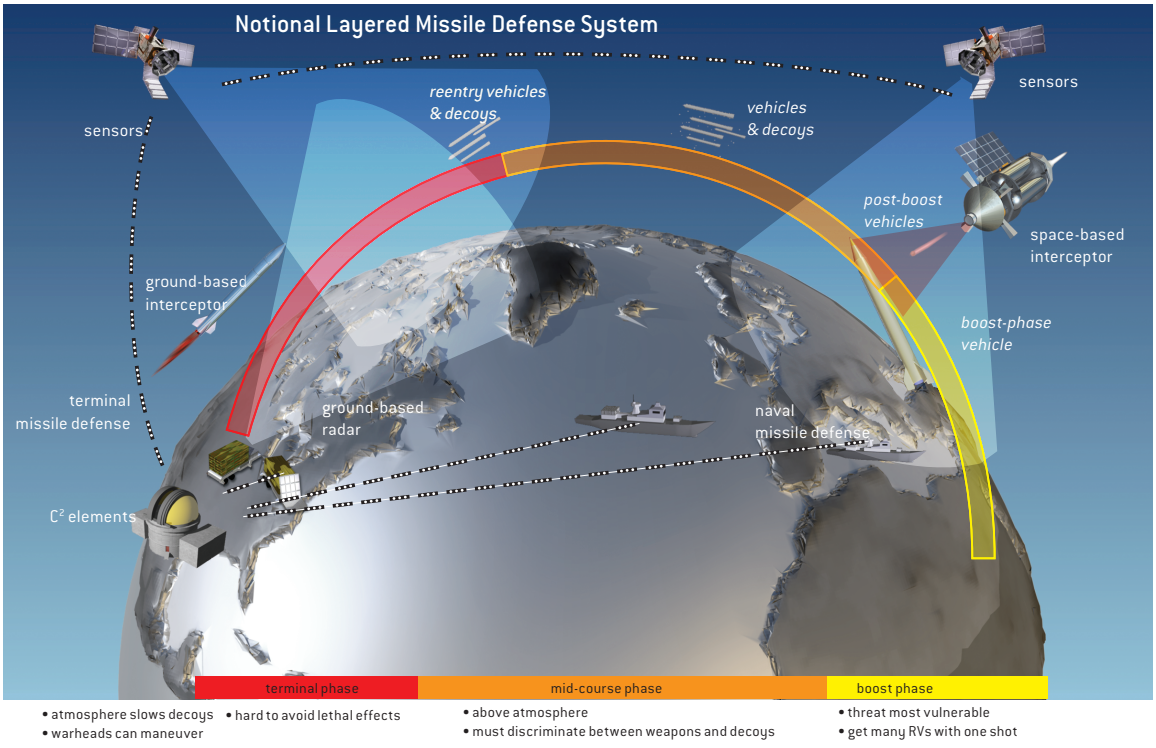
What is a layered defense?

Question 4

A layered defense system is comprised of elements capable of intercepting ballistic missiles/warheads in each of the three phases of their flight. A layered architecture affords multiple opportunities to destroy missiles and their warheads from launch through reentry (see diagram of Notional Missile Defense System).

Layered defenses have the additional advantage of complicating the design of the offensive systems they are deployed to intercept and destroy. In addition to providing the opportunity for multiple shots against a missile or its warheads, a layered approach also allows for the sharing of technologies between system elements. Thus, technologies used in one intercept vehicle can be shared with interceptors on other platforms resulting in cost-savings as well as additional logistical and interoperability benefits. Furthermore, in a multi-tiered system, failures at any given layer can potentially be compensated for in other layers.

In order to field an effective layered defense, it is essential that the United States develop and deploy systems that include space-based interceptor components, together with sea- and land-based elements. Given the existing and increasing ballistic missile threat arrayed against it (see Question 2), the United States should move ahead with development of a robust, layered defense.



question 5

What is *Brilliant Pebbles*?

Developed twenty years ago, *Brilliant Pebbles* is a space-based missile defense system that was designed to consist of 1,000 small satellites in low-Earth orbit, capable of destroying as many as 200 nuclear warheads. Weighing only 45 kilograms, each *Brilliant Pebble* platform would detect, track and intercept hostile missiles within its field of view. Sensors on the *Brilliant Pebble* would detect and locate the origin of a ballistic missile(s) launch and immediately begin tracking it. Each *Pebble* platform would know the location of all the other *Pebbles*, and calculate which was in the optimal position to intercept a given missile—and that *Pebble* would engage the missile, informing the rest of the constellation of this action. Thus, no potentially vulnerable central, single-point failure command post would be needed in order to attain high effectiveness.

The *Pebbles* would follow the entire path of attacking missiles, employing this battle management approach. Intercepts could occur in the boost phase, as the missile was rising from its launch pad, or later as the warhead was in midcourse flight in space, or as it was re-entering the atmosphere and approaching the target during the terminal phase. Thus, the *Brilliant Pebbles* constellation was actually a layered defense affording multiple opportunities for missile/warhead interception and destruction in all three phases of a missile/warhead's flight.

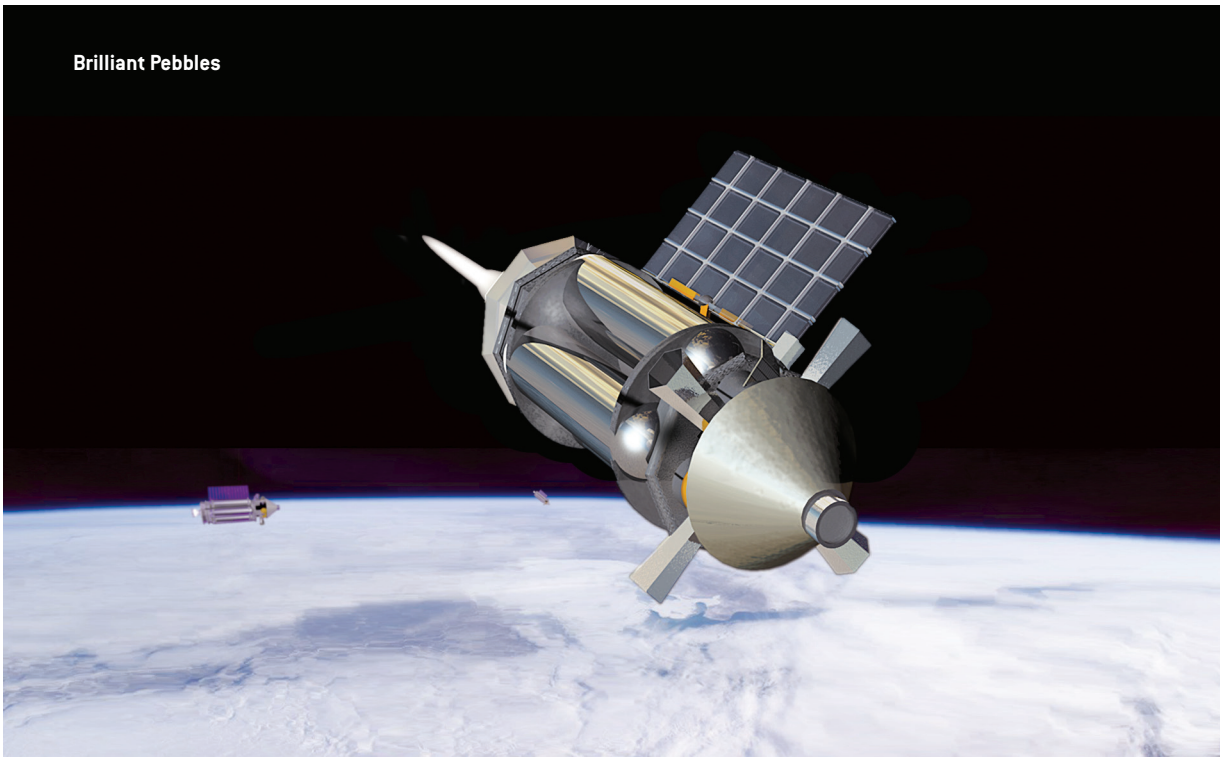
It was determined in thorough reviews, both inside and out of government, in 1989 and 1990 that the *Brilliant Pebbles* concept was the most efficient and reliable method of intercepting ballistic missiles/warheads. For example, *Brilliant Pebbles* survived numerous scientific and engineering peer reviews, including analyses by some groups hostile to space-based missile defenses, and intensive "red team" study against advanced offensive countermeasures. These reviews concluded that there were "no show shoppers" to developing and deploying *Brilliant Pebbles*.

Utilizing off-the-shelf commercial technology, the production, launch, and operational costs of a *Brilliant Pebbles* constellation would have been much lower compared to alternative means of missile defense against a similar size threat (i.e., 200 warheads). The 1989 formal Department of Defense (DOD) cost estimate to develop, test, deploy, and operate a 1,000 *Brilliant Pebbles* was $11 billion—or $19 billion in 2010 dollars. This figure should be compared to the total expenditure of $30.7 billion for the current Ground-based Midcourse Defense system (described in Question 3), which has the capability to intercept only a few hostile missiles.

Deployment of a 21st-century version of 1,000 *Brilliant Pebbles* would pose no major cost or other issues with regard to launch capabilities. Launch costs in 1989 were estimated to be approximately $1 billion. The United States would not need to use rockets especially designed for the launch of *Brilliant Pebbles*. Instead, we could utilize existing *Delta* or *Atlas* rockets to boost 1,000 *Brilliant Pebbles* platforms into orbit. A single rocket of either type would be capable of launching over a hundred individual

Brilliant Pebble platforms. It is important to point this out because there have been erroneous assessments of launch costs based on incorrect data about the weight of *Brilliant Pebbles* platforms and the number of *Brilliant Pebbles* that would be placed in space. These faulty data points led to mistaken launch cost estimates and the inaccurate conclusion that we would need to increase our annual space launch capacity by five to ten times in order to deploy *Brilliant Pebbles*.

A 21st-century version of *Brilliant Pebbles* would be much more capable and possibly weigh even less—hence lowering launch costs—given the considerable technological and miniaturization advances of the last two decades that would be available today.



question 6

Does the United States cooperate with its allies/ friends in international missile defense programs?

Yes: international missile defense collaboration has become an important tool for the United States to strengthen its alliances and coalitions. Missile defense not only defends the United States and our overseas forces, allies, and coalition partners from missile attack, it also buttresses extended deterrence, i.e., the security guarantees/assurances that the United States maintains with NATO partners and with other allies and friends, e.g., in the Middle East and the Asia-Pacific area. This is important because the perceived eroding of U.S. extended deterrence could motivate allies and friends to obtain their own nuclear weapons, thereby increasing proliferation. Missile defense reduces the incentives to initiate hostile action against the United States and its allies by augmenting the risk that such moves will be successfully countered.

In addition, U.S. international missile defense cooperation has several other benefits including: promoting information sharing and encouraging interoperability through the integration of U.S. and partner assets/systems; helping to identify international technology to improve U.S. missile defense capabilities; and assisting in discovering U.S.-allied investment opportunities.

U.S.-allied cooperative efforts/programs include: cooperation with NATO on missile defense connectivity and interoperability; initiation of the Phased Adaptive Approach program to defend Europe against missile/nuclear threats; bilateral cooperation with European nations such the United Kingdom (early warning radar), Germany (Medium Extended Air Defense System or MEADS), Denmark (early warning radar upgrades), the Netherlands (PAC-3), Italy (MEADS); Australia (technology cooperation/radars), South Korea (*Patriot*), and Japan (*Patriot* and *Aegis/ Standard* missile systems); joint development of the Israeli *Arrow* missile defense system; and an expanded U.S. missile defense dialogue with several Middle East states including Saudi Arabia, Kuwait, Bahrain, and the United Arab Emirates. The scope of U.S.-allied international missile defense efforts underscores the growing realization among our allies and friends of the threat posed by both ballistic missiles and nuclear weapons and the role that missile defenses can play to mitigate it.

Isn't our ability to retaliate with nuclear weapons sufficient by itself to deter an attack on the United States and/or its allies?

question 7

This question is based on Cold War thinking associated with the strategy of Mutual Assured Destruction (MAD). During the Cold War, the United States held its own population hostage to the intentions of its adversary. If the Soviet Union attacked the United States with nuclear-armed ballistic missiles, the United States would retaliate in kind. This mutual vulnerability was also known as the "balance of terror." We then assumed that both we and the Soviet Union so valued our survival that neither would initiate a nuclear war. But today we face enemies from rogue/failed states who threaten mass murder and who may not be deterred by the threat of retaliation leading to their own destruction.

In addition, suicide bombers and the 9/11 hijackers have demonstrated a willingness to sacrifice their own lives to attack the United States, and that they believe such attacks make them martyrs. Furthermore, captured documents reveal that Al Qaeda is seeking to obtain nuclear weapons for use against the United States. Deterrence of terrorist groups with a credible threat of nuclear retaliation is problematic because such groups are frequently stateless, residing/hiding in several different nations, are, as noted, willing to give up their lives, and could launch a nuclear missile attack (e.g., in the case of an EMP strike) against the United States, not from land but on the high-seas from a ship. In this situation, even if the United States were able to confirm who was responsible for launching the attack and in what country the terrorists were located, would we actually respond with a nuclear retaliatory strike against a nation whose population may not have had anything to do with the terrorist attack? A better approach is to have in place an effective missile defense which could deter terrorist attacks by calling into question the likelihood that the attack would succeed in the first place.

The first obligation of the U.S. government is to provide for the common defense of our population. In the security environment of the early 21st century, sole reliance on deterrence by threat of nuclear retaliation is no longer valid—if it ever really was—as the principal approach to protect the United States against a nuclear strike. It would be of little consolation to the hundreds of thousands (and potentially many times more) dead Americans that we could inflict similar carnage on another country's population. Instead, we ought to ask our political leaders why not field a more robust, layered missile defense to defend our population given that we possess the means to do so. A layered defense would bolster deterrence, minimizing the likelihood of an attack, and if one did occur, help avert the unprecedented devastation to the United States that otherwise would take place (see Question 4).

question 8

Doesn't the United States have sufficient time to develop necessary defenses once we have determined the existence of a specific threat?

As described in Question 2, the ballistic missile threat exists today in several forms and is increasing. Stepping back from that reality, however, the question defies the experience of history. Repeatedly, we have been surprised by events that were not anticipated: Pearl Harbor, the various Cold War crises, including the Cuban Missile Crisis, and more recently 9/11. It is now possible to launch short-range missiles against the United States from ships off our coasts. These could come in the form of an attack against our coastal cities or from an EMP strike. (See Question 2.) The technologies needed for a short-range nuclear ballistic missile attack or an EMP launch against the United States are widely available. Iran, whose president, President Mahmoud Ahmadinejad, has stated that a "world without America" is both possible and desirable, has already test-launched a ballistic missile from a ship in the Caspian Sea. A missile fired into the atmosphere off our East Coast could destroy much if not all of our electrical and electronic infrastructure. A nuclear missile launched against any number of U.S. coastal cities would multiply by many times the devastation caused by the 9/11 attacks.

Although we cannot fully predict the next crisis, we must take prudent steps to protect the American people. In fact it is the fundamental duty of our government to guard against the most catastrophic threats. It must not wait until "the horse is out of the barn." To develop and field a robust, layered defense requires advance preparation, planning, and action. We will need to build on the missile defense that has already been deployed.

Should further testing be conducted before additional missile defenses are deployed?

Question 9

We learn from our test failures as well as our successes, improving as we move forward with missile defense development, testing, and deployment. There now exists a substantial track record of success with a variety of missile defense interceptors under a range of testing conditions. While no weapon system in history has been perfect—and missile defense is no exception—the vast majority of missile defense tests have been successful. Still, since no one missile defense system can work perfectly, a fully tested and reliable layered defense should be deployed to provide redundancy and compensate for any technical difficulties.

As discussed in Question 5, by the late 1980s the United States had developed in *Brilliant Pebbles* all the technologies necessary for an advanced space-based missile defense that would have afforded several opportunities for intercepting a missile or its warhead along their flight path. The issue is not whether missile defense technologies will work. That missile defenses can work has long been established, and technologies continue to advance. The key issue is which defensive systems should be further developed and deployed, and why isn't the United States moving more rapidly to do so.

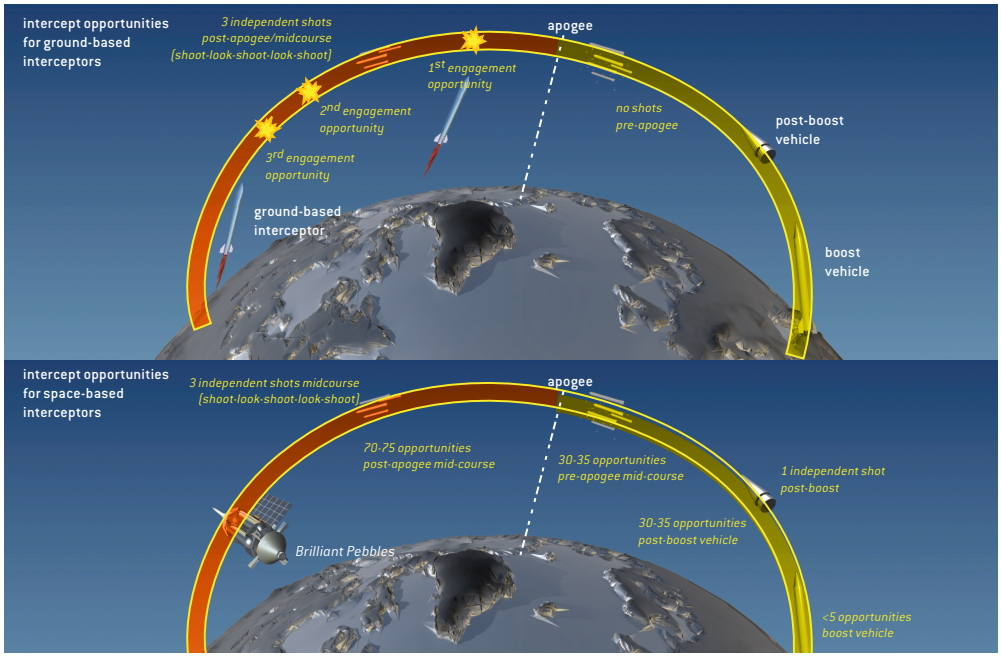
question 10

Isn't the threat of missile attack less likely than a suitcase bomb smuggled into the country and exploded in a city?

The United States must work to defend against any weapon of mass destruction (WMD), whether delivered by missile or non-missile means. Of course, homeland defense and security planning must have as a major focus countering the potential smuggling of a nuclear weapon into the United States or the terrorist use of a "dirty bomb," which uses an explosive charge to scatter radioactive materials and can be built using materials already here without the need therefore to smuggle them into the country.

While guarding against other threats with potentially devastating consequences, we cannot ignore the fact that missiles carrying nuclear, chemical or biological warheads are very attractive because they would not need to be smuggled into a country. They could be launched from a ship off our coast. Therefore, ballistic missiles remain a weapon of terror with potentially far greater consequences than a suitcase bomb. Our adversaries know well that a nuclear warhead delivered by a missile and detonated above a city would produce far greater human fatalities and physical destruction than one exploding at ground level as would occur with a suitcase bomb. Moreover, a suitcase bomb could not deliver EMP strikes designed to destroy the electronics controlling much of the U.S. infrastructure because they require detonation of a nuclear device at altitudes above a few dozen kilometers (see Question 2).

Missiles have also been made increasingly available to terrorist organizations by Iran, as seen with Hezbollah's launching hundreds of short-range missiles against Israel in 2006. Rogue states such as North Korea are also quite willing to export ballistic missiles. We need a comprehensive homeland security strategy that addresses these and other threats that could have catastrophic consequences. A robust, layered missile defense should be an integral part of that strategy.



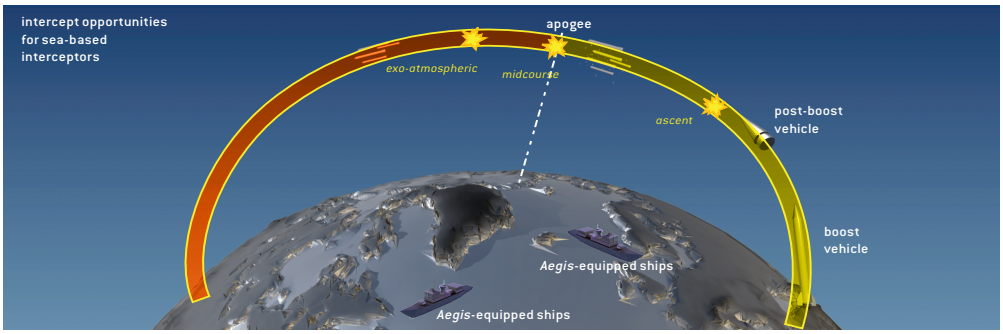
Aren't missile defenses easy to overcome because an enemy can simply build and fire more missiles to "saturate" any defenses?

question 11

In fact, missile defenses can be made sufficiently robust to destroy large numbers of missiles and warheads. This can be accomplished especially when there are multiple opportunities to destroy missiles and their warheads as would be the case in a layered defense (see Question 4). A layered defense would reduce the burden placed on any one missile defense element. In contrast, a single tier defense would need to be close to 100 percent effective.

With a layered defense, the task facing an enemy seeking to penetrate the missile defense is extremely challenging. Assume that the layered defense provides five shots against a missile or its warhead. We need only to be successful in one of the shots to destroy the missile or warhead. An enemy, however, must penetrate all of the layers of the defense to be assured of success. Building, fielding, launching, and maintaining many missiles and their payloads would also be expensive, and in the face of robust defenses an enemy may be deterred from making such an investment.

Without a robust, layered missile defense, an enemy could build missiles with reasonable confidence of reaching the intended target. With such a missile defense, however, this task is far more difficult and expensive for the adversary. For example, if a unit of defense can be made-and-operated far more cheaply than can a unit of offense—e.g., a nuclear warhead and its ICBM delivery vehicle—the offense attempting to "out-run" the defense with ever larger forces cannot win this battle and hence goes down the path to politico-economic ruin. By contrast, WMD and missile proliferation becomes more attractive in the absence of a missile defense.



question 12

Isn't missile defense too expensive?

Missile defense spending represents a small portion of the total U.S. defense budget: in 2010 just over $10 billion out of a total defense budget close to $700 billion. This means that missile defense comprises approximately one seventieth of what the nation is spending each year for defense. This amount pales in comparison to the devastating consequences of even a *single* successful nuclear missile attack against an American city. Even during the Reagan administration's Strategic Defense Initiative emphasizing defenses against missile attacks, the fraction of the DOD budget devoted to missile defense never rose as high as 2 percent. The present investment level in defenses against missile attacks is also miniscule compared with the nearly $800 billion appropriated in the economic stimulus.

It is impossible to calculate the cost of a devastating attack on one or more of our major cities that could be prevented by missile defense. As in the case of 9/11, we would never know precisely how much lost talent, earning power, and the overall contribution to our society there would have been if so many highly productive people had not died. But in place of the 3,000 fatalities resulting from the 9/11 attacks, we could face losses in the hundreds of thousands, if not many times more. Unlike the 9/11 tragedy, the deaths would be accompanied by massive numbers of injuries, such as burns, radiation sickness, cancers, and other untold horrors. One may ask whether the cost of an insurance policy is worth the amount we are called on to pay, contrasted with other ways that finite financial resources could be spent or invested. Missile defense should be regarded as an affordable catastrophic insurance policy.

The cost of missile defense also depends on the type of system and the threat against which it is deployed. During the Cold War, an effective missile defense would have had to destroy large numbers of Soviet warheads. With the end of the Cold War, it is assumed that this threat has been reduced. The more modest, limited missile defense now being pursued by the United States is not designed to intercept even the lower number of Russian missiles and warheads now in Moscow's inventory or the nuclear force being deployed by China. It is instead configured against a few missiles and warheads such as might be launched by North Korea or Iran. Whether the United States should also defend against, for example, the growing Chinese missile arsenal, is a serious strategic question that needs to be considered. Secretary of State Hillary Clinton has declared that the United States will need to offer a "defense umbrella" to allies especially in the Middle East if Iran acquires nuclear weapons. This will require more, not less, investment in missile defense. The most effective way to do this would be to deploy a layered system including space-based interceptors. (see Questions 4).

Why doesn't the United States negotiate a treaty that bans space-based missile defense because space weapons can also destroy satellites?

question 13

U.S. missile defenses are not designed to destroy satellites: their mission is to protect the U.S. population, its forward deployed armed forces, and allies and friends. The thrust of this question implies that an equivalence exists between preserving satellites and protecting hundreds of thousands—or more—American lives. This is an inexplicable notion.

However, even taking it at face value, the question is tantamount to asserting that an automobile driven recklessly can kill people and therefore that automobiles should be banned. Like automobiles, how technologies are used depends upon those who use them. Furthermore, it is difficult, and probably impossible, to define what is a space weapon. For example, ground-based systems can also be used to destroy satellites in space, as seen by China's destruction of a weather satellite in January 2007 using a ballistic missile. Because objects in space can be targeted either from the ground, from the air, or from space by satellites that appear benign, our ability to define a "space weapon" in a treaty is highly doubtful—as demonstrated by previous arms control negotiations that dealt with these issues. And if one cannot satisfactorily define a space weapon, one cannot ban it in a treaty. Extensive discussions and negotiations over time have shown this to be true.

Moreover, space treaty proposals which would ban space-based interceptors while allowing ground-based anti-satellite weapons would do little to protect satellites but much to keep the United States vulnerable to hostile missiles aimed at targets here on Earth. Furthermore, any medium- or long-range ballistic missile is potentially capable of shooting down low-Earth-orbit satellites.

Some are urging that the United States sign on to a draft treaty circulated by Russia and China. The only possible result of doing so would be to tie U.S. hands while leaving our potential adversaries to continue existing space programs and commence new ones. Recognizing that verification—which President Reagan ("Trust but verify") recognized was essential to any meaningful arms control agreement—in this area will be virtually impossible, Article VI of the draft treaty simply provides that verification measures may be agreed upon at some future date. The treaty provides no limitations on ground-based anti-satellite systems, or space-based systems that arguably have a "dual use." Any effort to strengthen such a treaty to prohibit space-based systems that have a military purpose might arguably require us to destroy our Global Positioning System (GPS) navigation constellation, and communications and weather satellites—utilized extensively by our military—without getting anything of value in return. This would decrease our ability to predict deadly hurricanes and impede emergency response vehicles that now find their way to fires and medical emergencies by use of GPS satellites.

In February 2008, the United States destroyed a decaying U.S. satellite, whose debris could have caused human casualties or other damage on Earth, with a modified missile defense interceptor fired from a U.S. Navy cruiser. Here, too, the launch came from the surface of the Earth. The U.S. launch demonstrated how an existing defense against short- and medium-range ballistic missiles could quickly be modified to shoot down a satellite moving slightly faster than an intercontinental ballistic missile, with only several weeks of preparation—primarily by software modifications. Clearly, advanced technology now enables us to disable or destroy a target moving at high speed—to hit a bullet with a bullet.

Finally, in some cases, the United States may want a space-based missile defense to have the capability to destroy an adversary's satellite, particularly if that satellite is being actively used to interfere with U.S. military operations and/or if it is a type of satellite reportedly being developed by China that could destroy U.S. space systems by colliding into them.

question 14

Wouldn't space-based missile defense weaponize space, which should remain free of weapons?

Since 1967 we have had an Outer Space Treaty that prohibits stationing weapons of mass destruction in space. Such weapons are considered to be offensive weapons. The purpose of missile defense, by contrast, is to defend against weapons of mass destruction. The Outer Space Treaty already limits the use of space to "peaceful purposes." It has long been established that "peaceful purposes" means "non-aggressive purposes," and the right to self defense is expressly recognized by Article 51 of the United Nations Charter. Almost identical language appears in the United Nations Convention on the Law of the Sea, yet no serious person has argued that warships are banned from the high seas. Indeed, just as the Law of the Sea Convention includes several references to military activities at sea, the Outer Space Treaty includes references to military activities in space.

Ballistic missiles spend much of their trajectory in space as they move from Earth through space to their designated target. This is one major reason why space-based defenses would be so effective in that they would intercept such missiles in space well before they descend toward their target.

Shouldn't the United States set an example for the world by foregoing the use of space for military purposes, including space-based missile defenses?

question 15

Space is already weaponized and the United States is not the first nation to do so. The weaponization of space began when the German V-2 rockets were launched against targets in England in 1944. Ballistic missiles fly much of their total flight trajectory to their targets through space. In addition, orbiting satellites serve many military purposes, including early warning and surveillance, navigation, targeting and damage assessment, and command, control and communications. As such space capabilities become more extensive and commonplace, the use of space for military operations will only grow.

We are highly dependent on space-based systems for our daily lives and our military. They have become critical for keeping casualties and costs low and effectiveness high for U.S. air, land, and sea military operations. Our enemies recognize that this is our Achilles Heel and thus we need the ability to protect our satellites from attack. For the United States to restrict itself in the use of space would impose a huge handicap with ever more severe adverse commercial and military consequences.

Sea-based X-Band radar (SBX)
photo courtesy of *Missile Defense Agency*

question 16

Won't missile defenses provoke a destabilizing arms race?

Arms races arise from political differences. States or individuals arm when they want to threaten others or to defend themselves. As political differences subside, so do arms races. Furthermore, the absence of missile defense has invited and encouraged the proliferation of ballistic missiles worldwide since the Cold War. During the Cold War, the 1972 Anti-Ballistic Missile (ABM) Treaty prohibiting a national missile defense was followed by a huge build-up of missiles targeting the United States and its allies. In the absence of U.S. missile defense, the Soviet Union made large-scale investments in ballistic missiles and nuclear warheads.

As a notable aside, when the Soviets focused on building ballistic missiles capable of striking the United States in the 1950s, we had an extensive air defense system against Soviet long-range strategic bombers carrying nuclear weapons and no missile defense. Once we dismantled our air defenses in the 1960s, the Soviets increased their investment in strategic bombers as well. Therefore, it could be argued that having no or limited defenses is in fact provocative and leads to an increase of offensive threats to take advantage of the weakness.

Furthermore, the largest Soviet ICBM build-up occurred after the ABM Treaty was signed, after the United States stopped deploying its *Minuteman* ICBM missiles, and after the single permitted U.S. missile defense site in North Dakota was decommissioned. Harold Brown, President Carter's Secretary of Defense and a former member of the U.S. SALT/ABM Treaty Delegation, noted this ironic denial of the linkage argument in stating, "We build, they build; we stop, they build." Indeed, many believe that the U.S. deployment in the 1980s of the *Pershing* II and Ground Launched Cruise Missiles in Europe, the Strategic Modernization Program, and especially the Strategic Defense Initiative to develop a layered missile defense launched by President Reagan in 1983, led to the first major reductions in nuclear weapons in history.

Developing a more robust, layered missile defense system which incorporates space-based interceptors as well additional sea-based capabilities would not create any new threat, even to our adversaries, but would simply enable us to protect our population from those who may not be deterred by the threat of retaliation. We and our allies have both the duty and the right to defend our populations and U.S. armed forces against such attacks. Among its benefits, missile defense would discourage our enemies and potential adversaries from spending money on programs to kill countless numbers of innocent Americans and permitting us to protect those people if deterrence fails. Hence, a missile defense would likely serve to limit the chances of an arms race.

Independent Working Group

The Independent Working Group (IWG) on Post-ABM Treaty Missile Defense and the Space Relationship was formed in 2002. Our goals are severalfold: (1) to examine the evolving threats to the United States, its overseas forces, allies, and coalition partners from the proliferation of ballistic missiles; (2) to examine missile defense requirements in the twenty-first century security setting; (3) to assess current missile defense programs in light of technological opportunities in the post-ABM Treaty world; and (4) to set forth general and specific recommendations for a robust, layered missile defense for the United States.

In pursuit of these objectives, the IWG meets several times a year. These meetings provide an opportunity not only to analyze issues directly related to missile defense, but also to identify a large number of additional topics for discussion. The IWG includes members with technical expertise as well as participants familiar with the politics of missile defense.

To download the latest reports and find out more about IWG's work and publications, visit:

WWW.IFPA.ORG

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