AUSA BACKGROUND BRIEF

No. 36 December 1991

BALLISTIC MISSILE PROTECTION

Introduction

For the first time in four decades, the possibility of a strategic nuclear missile exchange or a sudden conventional war with the Soviet Union is not the primary threat. However, the defunct Cold War scenario has been replaced by at least two other possibilities: (1) the accidental firing of one or more of the thousands of Soviet ballistic missiles; or (2) the employment of ballistic missiles by a rogue state against a regional neighbor, or against the United States, any of our allies, or our deployed forces.

The second scenario became a reality when Iraq fired SCUD missiles against Saudi Arabia and Israel in the Persian Gulf War and when Libya fired ballistic missiles at U.S. targets on Lampedosa Island after the 1986 American bombing raid on Tripoli. In light of all these developments, our government has redefined its priorities to make defensive measures against limited ballistic missile strikes a major security objective.

Ballistic Missile Proliferation

For the foreseeable future, a major consideration in our national security planning will be the ever-increasing threat to the United States, its friends, and deployed forces posed by the worldwide proliferation of ballistic missiles and weapons of mass destruction. Consider the following:

- Today some 14 Third World countries possess ballistic missiles; within a decade that number could grow to two dozen or more.

- While most of these ballistic missiles have a range of less than 600 miles, by the year 2000, six or more nations will probably have ballistic missiles with ranges of 1,800 to 3,300 miles. Some could have missiles that would be able to reach the continental United States.

- Almost all of these countries have chemical weapon programs. At least four of them possess or are working on nuclear weapons; that number could possibly double by the end of this decade.

For our part, the threat of a ballistic missile strike requires a military capability in order to: (1) deter such use by a potential adversary or (2) if this fails, be able to successfully engage and defeat a ballistic missile attack. As evidenced by the Persian Gulf War, some despots are clearly willing to use these high technology weapons and to bear the consequences of their actions. In recognition of this, the national security strategy of the United States has given priority to the development of capabilities to provide global protection against limited ballistic missile strikes (GPALS).

Ballistic Missile Defense

The limited ballistic missile attack protection system (Appendix One) visualizes three major integrated components:

- theater ballistic missile defenses and associated space-based sensors to protect U.S. forces deployed abroad as well as friends and allies;

- ground-based defenses and associated space sensors to protect the United States against long-range ballistic missiles;

- weapon systems based in space to intercept ballistic missiles with ranges greater than several hundred miles.

The development and deployment of these systems is evolutionary. In the near term the focus will be on theater missile defenses. Starting in the mid-1990s, wide-area defense systems could be deployed. Space-based sensors and weapon systems deployed a few years later could provide global surveillance and protection for the United States, as well as for deployed forces and allies. U.S. ground-based defenses could be deployed concurrently and would depend on space sensors for tracking and discrimination information. The principal weapon systems under each of these components are described below.

Theater Ballistic Missile Defense (TMD). TMD includes upgrading the Patriot Air Defense System which was so successful during the Persian Gulf War. The Patriot preplanned product improvement (P^3I) would give the system (a point-defense weapon) greater capability against theater ballistic missiles in terms of lethality and would provide wider area coverage.

Concurrently under development is the Extended Range Interceptor (ERINT), designed to destroy an attacking ballistic missile by collision well into the atmosphere but before the final part of its terminal phase, thus avoiding the damages from lethal debris. ERINT would be fired from the Patriot launcher and, since it would be significantly smaller than the Patriot, 16 ERINTs rather than four Patriot missiles could be loaded on each launcher.

The Theater High Altitude Air Defense (THAAD) missile, presently a research concept, would be designed to attack missiles at high altitudes and at midrange. THAAD would provide a high altitude large area overlay to such point defenses as Patriot and ERINT, whose area coverage is limited.

The Corps Surface-to-air Missile (Corps SAM) is a future system which will replace the aging Hawk medium-range air defense missile system. The new system will be designed to provide corps-level air defense capability against both aircraft and tactical missiles.

Also being developed is Arrow, an Israeli-U.S. initiative for a theater ballistic missile interceptor. A series of flight experiments, identified as Arrow Continuation Experiments (ACES), will further develop the concept to provide improved area coverage once the required agreements between the two nations are concluded.

Sensor capabilities to detect ballistic missiles include the mobile TMD Ground-based Radar (GBR), as well as ship-based capabilities. Space-based sensors (Brilliant Eyes) would provide surveillance, tracking and discrimination during post-boost and midcourse phases of a ballistic missile launch.

U.S. Ground-based Strategic Ballistic Missile Defense. When fully developed, this segment of the system would provide coverage of the entire United States including Hawaii and Alaska. Two concepts are under consideration. The Endo-exoatmospheric Interceptor (E^2I) would engage a target vehicle high in the earth's atmosphere where drag would strip away decoys and allow the interceptor to discern and destroy the actual reentry vehicle. One big problem here is that atmospheric heating creates technical problems for the sensors. A second ground-based interceptor (GBI) would target reentry vehicles outside the atmosphere during midcourse. This makes sensor design less difficult but presents a more difficult discrimination problem. Either system would destroy the target upon impact through the force of collision.

Sensors include the mobile Ground-based Radar-Terminal (GBR-T), to provide search, tracking and discrimination for ground-based interceptors; the Ground Surveillance and Tracking System (GSTS), a ground-launched suborbital rocket surveillance system which would provide tracking and discrimination of midcourse objects; and the space-based capabilities of Brilliant Eyes.

Space-based Ballistic Missile Defense. Space-based interceptors (Brilliant Pebbles) would destroy ballistic missiles during the early phase of flight. These interceptors would be in positions to offer broad area coverage to protect many targets simultaneously. That would conceivably include protection for forces arriving in a theater of operations prior to establishing their own defense capabilities. Brilliant Pebbles could intercept tactical ballistic missiles whose range exceeds a few hundred miles and whose apogee of flight is not less than 60 miles. The modified SCUD missiles launched by Iraq during the Persian Gulf War, for example, could have been successfully engaged by Brilliant Pebbles.

Appendix Two briefly defines each system addressed in this paper.

The Future of the System

Under the GPALS concept, Strategic Defense Initiative (SDI) priorities have been changed to provide a high level of protection for the United States against limited missile strikes — defined

as up to 200 reentry vehicles — whatever the source. At the same time, the concept includes the development of an effective theater missile defense system to protect our forward deployed forces and our allies.

Full GPALS coverage of the United States, including Alaska and Hawaii, would require about 750 ground-based interceptors at six sites, plus about 1,000 space-based Brilliant Pebbles interceptors. All elements of the system are presently under research and development and no deployment decisions have yet been made. These will be approved incrementally as the program progresses.

The present Anti-Ballistic Missile (ABM) treaty with the Soviet Union (signed in 1972 and amended in 1974) restricts testing and limits the United States to a single site with 100 ground-based interceptors and no aerial interceptors. Thus, changes to the treaty would have to be negotiated before GPALS could proceed to completion. The ABM treaty is a roadblock and must be dealt with by the mid-1990s if future deployments are to proceed.

The full GPALS system would integrate theater missile defenses, ground-based defenses against strategic missiles, space-based interceptors (Brilliant Pebbles) and sensor system (Brilliant Eyes) into a continuous worldwide defense. Initial fielding for the next generation theater missile defense could begin as early as the mid-1990s, with other portions of GPALS extending to the end of the decade and beyond.

Present estimated cost of the total system (in FY 1991 dollars) is about $46 billion spread over the next 14 years. Of this, $25 billion would be for ground-based defenses in the United States, $11 billion for space-based defenses (Brilliant Pebbles) and $10 billion for theater missile defenses.

Congressional Authorization and Funding

Congressional committees, while defining priorities, are maintaining a tight rein on GPALS. The National Defense Authorization Act for FY 1992 and FY 1993 prescribes a multiple-site capability for defending the United States against limited ballistic missile attacks. It specifies the deployment of a treaty-compliant, single site system by FY 1996, with instructions that the administration should pursue negotiations to amend the ABM treaty. No noncompliant testing or deployments, however, are authorized at this time. Strong congressional support was also expressed for theater missile defenses with the objective of deploying improved systems by the mid-1990s.

A total of $4.15 billion was authorized for the Strategic Defense Initiative for FY 1992, based on the GPALS concept. Funding is specified as follows:

- limited defense system — not more than $1.521 billion;
- theater missile defenses — not more than $828.7 million;

- space-based interceptors — not more than $465 million, of which not more than $360 million is available for Brilliant Pebbles;

- other follow-on systems — not more than $629.6 million;

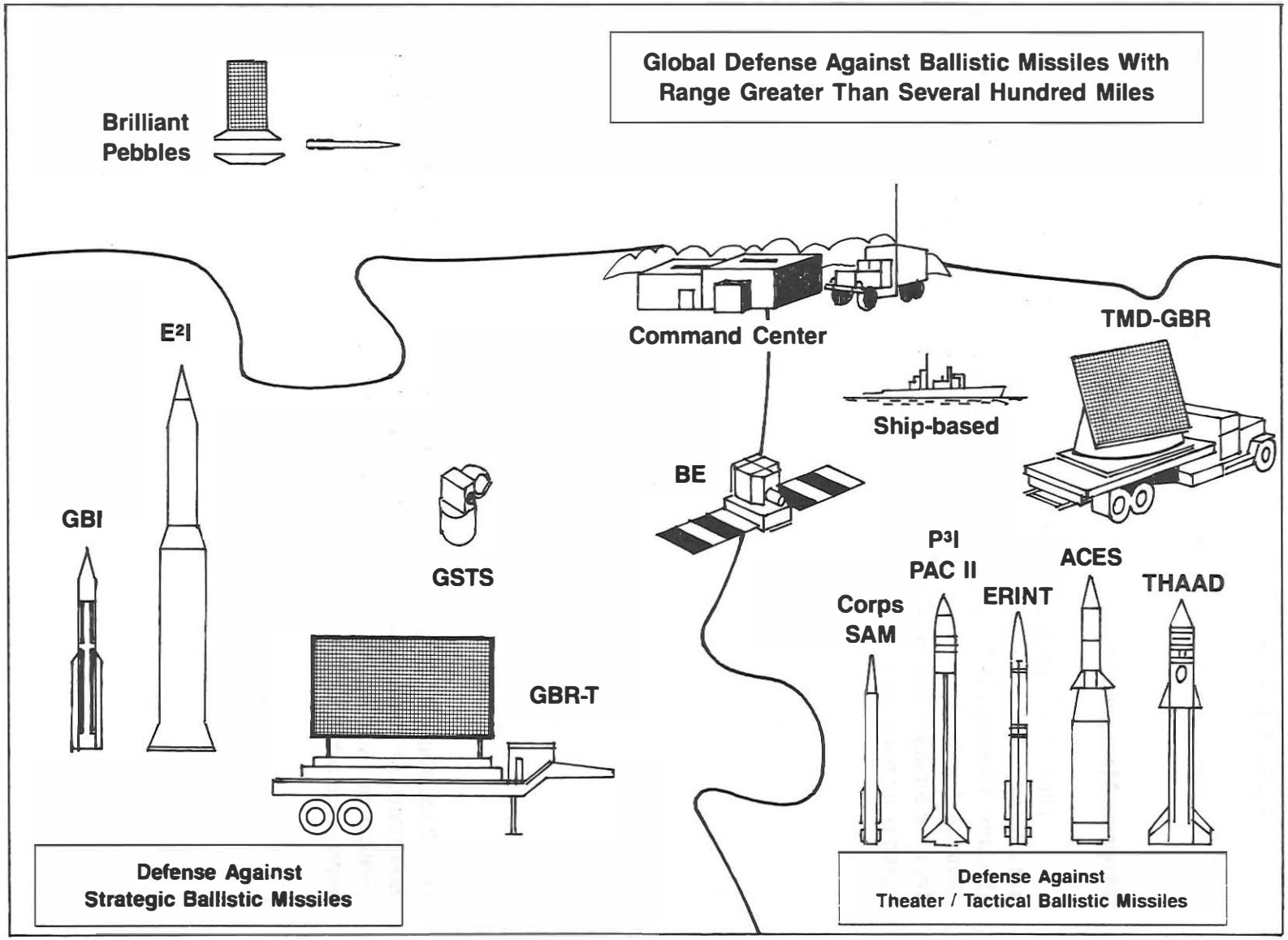
- research and support activities — not more than $705 million.

Program Management

The overall management of GPALS, including the theater missile defense program, is vested in the Strategic Defense Initiative Organization (SDIO). All the services are active participants, with the Army's Strategic Defense Command playing a major role in the development of the ground-based systems. For the Army, it has been agreed that theater missile defense systems will be transferred from the Strategic Defense Command to the Program Executive Office for Air Defense when the systems are ready for full-scale development.

# # #

GLOBAL PROTECTION AGAINST LIMITED STRIKES (GPALS)



APPENDIX TWO

GLOSSARY OF BALLISTIC MISSILE DEFENSE TERMS

Arrow and ACES: A theater ballistic missile defense interceptor concept being jointly developed with the Israeli government. With a defense range significantly greater than Patriot, ACES (the follow-on to Arrow) is designed to be an area defense weapon.

Brilliant Eyes (BE): Space-based satellite sensors for surveillance, tracking and discrimination during post-boost and midcourse phases. Primarily supports ground-based interceptors.

Brilliant Pebbles (BP): A distributed, autonomous, space-based interceptor and sensor system. Designed to destroy enemy missiles during the early phases of their flight by colliding with them. Can intercept any ballistic missile with range in excess of several hundred miles.

Command Center Element (CCE): Distributed system of facilities, equipment, communications, personnel and procedures that supports decision-making, battle planning and execution of the missile defense mission.

Corps Surface-to-air Missile (Corps SAM): The corps-level air defense system concept for protection against future threats of aircraft and tactical missiles. The concept includes improvements to current air defense systems and new system approaches. A cooperative program with allies having common requirements is envisioned. The program is managed by the Army and funded through the SDIO to ensure it will support the overall tactical missile protection program. Corps SAM will replace the Hawk missile system as a low-to-medium altitude air defense system operating in support of deployed corps, contingency operations and rapid reinforcement missions. It will be an integral part of the overall air defense/tactical missile defense architecture.

Endo-Exoatmospheric Interceptor (E^2I): An interceptor deployed on the ground that uses the atmosphere for discrimination of warheads from decoys; can also intercept in later midcourse (i.e., can intercept both inside and outside atmosphere). Designed for U.S. defense, destroys target through force of collision.

Extended Range Interceptor (ERINT): A theater missile defense interceptor that works with the Patriot launch system, providing greater firepower and destroying targets in the low atmosphere by

colliding with them. Due to its small size, 16 ERINTs rather than four Patriot missiles can be loaded on each launcher.

Global Protection Against Limited Strikes (GPALS): A defensive system proposed by the president to protect the United States, its allies and friends, and deployed forces against accidental or intended limited ballistic strikes. Surface- and space-based sensors and surface- and space-based interceptors provide the needed worldwide surveillance and protection.

Ground-based Interceptor (GBI): Interceptor designed to engage reentry vehicles outside the atmosphere (exoatmosphere) during midcourse. Designed for U.S. defense, GBI destroys target by force of impact.

Ground-based Radar-Terminal (GBR-T): A ground-based sensor which provides search, tracking and discrimination capabilities for the ground-based interceptors. TMD-GBR is the theater version of this radar capability.

Ground Surveillance and Tracking System (GSTS): A ground-launched suborbital rocket surveillance system which uses sensors to perform tracking and discrimination of midcourse objects. Functions for less than thirty minutes once launched.

Patriot Preplanned Product Improvement (P^3I): An enhancement to the Patriot missile defense system to give it greater capability against theater ballistic missiles. Includes multimode ("fire and forget") seeker, higher velocity and enhanced fire control radar.

Theater High Altitude Area Defense (THAAD): A theater missile defense concept to destroy theater/tactical ballistic missiles at high altitude, through the force of impact. Would provide large area defense capability and overlay to point defenses such as Patriot and ERINT.