The European Phased Adaptive Approach at a Glance

On September 17, 2009, President Obama announced that the U.S. would pursue a “Phased Adaptive Approach” to missile defense in Europe. The new approach is centered on the Aegis missile defense system and is being deployed in three main phases from 2011 to perhaps 2020. A fourth phase to have been fielded after 2022 was cancelled in March 2013. [For more on this development, please see, “Pentagon Shifts Gears on Missile Defense”]

The European Phased Adaptive Approach (EPAA) is the U.S. contribution to NATO’s missile defense system and is designed to protect Europe against short-, medium-, and intermediate-range ballistic missiles launched from Iran. The approach consists of sea- and land-based configurations of the Aegis missile defense system, the centerpiece of which is the Standard Missile-3 (SM-3) interceptor. A new, more capable version of the SM-3 is being developed, and the system will be increasingly integrated with an evolving network of land and space-based sensors. According to the Obama administration, the plan uses technology that is both “proven” and “cost-effective,” and will be able to adapt as threats evolve.

The EPAA broke with the plans pursued by the Bush administration. The Bush plans had called for deployment of a ground-based missile defense system in Europe, similar to the system deployed in California and Alaska. This included bilateral agreements to station ground-based interceptors in Poland and a radar installation in the Czech Republic.

As part of the EPAA, Turkey is hosting a radar at Kürecik, Romania is hosting an Aegis Ashore site at Deveselu Air Base, Germany is hosting a command center at Ramstein Air Base, and Poland will host another Aegis Ashore site at the Redzikowo military base.

Phase 1, consisting of the radar in Turkey, command center in Germany, and deployed ballistic missile defense (BMD)-capable Aegis ship by the U.S. Navy, has been operational since 2012. In May 2016, NATO declared operational the Romania Aegis Ashore site as part of EPAA Phase 2. At NATO’s July 2016 Warsaw summit, NATO declared the Initial Operational Capability (IOC) of the NATO ballistic missile defense system and is progressing towards full operational capability. Phase 3 will see the deployment of the Poland Aegis Ashore system perhaps by FY2020 instead of the original 2018 target. The Missile Defense Agency says the completion of the Poland site has been delayed by at least a year due to contractor performance issues.

The following chart provides an overview of the different EPAA phases. It contains information on the planned scheduling of the phases, the deployment platforms, missile upgrades and the sensors which will be integrated into the system. More has been disclosed about the earlier phases; some of the specifics of the later phases are still to be determined.
In March 2011, the USS Monterey was deployed to the Mediterranean Sea. This represented "the first sustained deployment of a ballistic missile defense-capable ship" in support of the European PAA.

In fiscal year (FY) 2012, 113 SM-3 Block IA and 16 SM-3 Block IB interceptors were delivered and 29 Aegis-equipped BMD ships deployed.

The SM-3 IA successfully intercepted a medium-range ballistic missile target in its most recent test on October 20, 2015.

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<th>SM-3 Variant and Numbers</th>
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<td>SM-3 Block IA interceptors have a velocity of 3 km/second and are designed to engage short- and medium-range ballistic missiles in the mid-course phase.</td>
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<td>Block IA has a single-color seeker, a 21 inch-diameter booster, and is 13.5 inches in diameter along the rest of the interceptor.</td>
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<td>Block IA costs between $9 and 10 million per unit.</td>
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<td>Some SM-2 Block IVs (the SM-3 predecessor) will also be retained for use against missiles in the terminal phase.</td>
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<th>Sensors and Combat System</th>
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<td>Initially, the system will use sea-based sensors mounted on the Aegis ships, as well as a forward-based mobile X-band radar on land. The first EPAA radar was deployed in Turkey in late 2011.</td>
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<td>The mobile X-band radar is the AN/TPY-2 manufactured by Raytheon. The U.S. is planning to deploy a total of 18 AN/TPY-2 radars. So far, seven have been produced, and two are currently deployed in Israel and Japan.</td>
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<td>In May 2018, the GAO reported a total of seven AN/TPY-2 radars are deployed to support regional defense. Four radars are deployed to Pacific Command (two for use in forward-based mode and two for use in terminal mode), two are deployed to European Command and one is deployed to Central Command.</td>
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<td>The sensors and interceptors will be brought together under the Aegis combat system. This is a system capable of tracking 100 simultaneous targets. Phase 1 will primarily use Aegis version 3.6.1 software.</td>
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<td>According to the Defense Science Board (2011), the current Aegis shipboard radar is inadequate to support the EPAA mission, and the future Navy ship-based Air and Missile Defense Radar (AMDR) is needed.</td>
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<td>U.S. and European BMD systems are</td>
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integrated for battle management at Ramstein Air Force Base in Germany.

Phase 2 includes interceptors on land in the first "Aegis-Ashore" deployment in Romania. Interceptors have also been mounted on an increasing number of Aegis BMD ships in support of global missions.

According to the FY2019 budget submission, by FY2019, the U.S. Navy plans to have 41 Aegis BMD ships, and 57 by FY2023.

The first "Aegis-Ashore" site in Romania is equipped with one land-based Aegis SPY-1 radar and 24 SM-3 missiles.

Phase 2 achieved a Technical Capability Declaration in 2015, meaning that the site transitioned from the construction to integration phase. In May 2016, NATO declared the Romania Aegis Ashore site operational. NATO declared the IOC of the system in July 2016.

Phase 2 included the SM-3 Block IB variant, also with a velocity of 3 km/sec. This interceptor differs from the Block IA in its "seeker" technology, consisting of a two color seeker, or "kill warhead," and improved optics.

The SM-3 Block IB missiles are placed in the MK-41 launcher.

According to the FY2017 budget submission, the inventory of SM-3 Block IB interceptors stood at 92 in 2016, with 128 planned for FY17. By FY21, the MDA is planning an inventory of 271 Block IB interceptors.

The Block IB is estimated to cost between $12 and 15 million per interceptor.

In Phase 2, sensors were integrated with updated versions of the Aegis combat system. BMD ships carry versions 3.6.1, 4.0.1, and 5.0.

Phase 3 will see the introduction of the second “Aegis-Ashore” site in Poland with another SPY-1 radar and 24 SM-3 missiles. This will supplement the deployments at sea and in Romania and will extend coverage over a greater percentage of Europe.

Phase 3 will include the SM-3 Block IIA interceptor. This new variant will be faster than Block I (4.5 km/sec vs. 3 km/sec.), with a 21 inch diameter for the whole length of the missile allowing for more fuel and hence a more powerful motor. This will give the system an “enhanced” capability to address intermediate-range ballistic missiles and potentially a “limited” capability to address...
intercontinental ballistic missiles (ICBMs).
  - The first intercept test of the new SM-3 IIA interceptor occurred in February 2017 and was successful. However, the second and third intercept tests of the missile in June 2017 and January 2018 failed to destroy their targets. There were two more tests before the end of 2018 on Oct. 26 and Dec. 11, both successful, with the December test particularly notable for being the first successful intercept of an IRBM target and using the ability to "engage on remote" using a forward-based sensor.
  - Four Block IIAIs are planned for delivery in FY2018, with an additional 27 planned for FY2021.

### Sensors and Combat Systems
- In Phase 3, the United States will deploy both the Airborne Infrared (ABIR) sensor platform, a system designed to track significantly larger numbers of incoming missiles, with the goal of being able to track “hundreds” of missiles simultaneously.
- Aegis BMD ships are scheduled to be equipped with version 5.1 of the combat system software in this time-frame.
- Phase 3 of the EPAA is scheduled to include an “engage on remote” capability for Aegis interceptors to conduct operations based entirely on off-board radar information, thereby expanding the range of the Aegis systems. In this capability, the interceptor can be both launched and guided to intercept by sensors remote from the launching ship.

### Missile Platforms and Numbers
- The platforms supporting the SM-3 interceptors under Phase 4 would have remained the same as those deployed under Phase 3 – sea-based platforms and the “Aegis-Ashore” deployments in Romania and Poland.

### SM-3 Variant and Numbers
- The SM-3 Block IIB; planned numbers unknown. Was planned to have an improved seeker and a higher performance booster, with a velocity of 5-5.5 km/sec. Was expected to marginally improve the Block IIA’s “limited” capability to counter ICBMs.
- According to the Defense Science Board (2011), the SM-3 IIB’s planned mission to intercept targets prior to the deployment of multiple warheads or penetration aids - known as "early intercept" - requires "Herculean effort and is not realistically achievable, even under the most optimistic set of deployment, sensor capability, and missile technology assumptions."
- The Block IIB was in the conceptual stage.

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