Ground-Based Midcourse Defense (GMD)

Executive Summary

- The Ground-Based Midcourse Defense (GMD) program was not able to follow the test program described in the Integrated Master Test Plan that was approved in December 2004 due to two consecutive flight test failures in December 2004 and February 2005.
- The Missile Defense Agency (MDA) has restructured the program in response to recommendations from an Independent Review Team and a Mission Readiness Task Force. Their findings confirmed the developmental nature of the GMD element.
- A new Integrated Master Test Plan that reflects this new program is in the approval process.
- Integrated ground testing continues to provide valuable insight into system behavior.
- The lack of flight test validation data for the simulations that support the ground testing limits confidence in assessments of defensive capabilities.
- Establishing confidence in the Block 04 capability is a top priority for the GMD test effort.

System

GMD is the principle element of the Ballistic Missile Defense System (BMDS). The GMD Block 04 configuration is a distributed system consisting of the following elements:

- Cobra Dane Upgrade radar at Eareckson Air Station (Shemya Island), Alaska
- Upgraded Early Warning Radar at Beale Air Force Base, California
- Ground-Based Interceptor missiles at Fort Greely, Alaska (10 missiles) and Vandenburg Air Force Base, California (two missiles)
- GMD Fire Control/Communications at the Joint National Integration Center; Schriever Air Force Base, Colorado; and Fort Greely, Alaska
- GMD Communications Network
- External interfaces include Aegis BMD; Cheyenne Mountain Operations Center, Colorado; and Space-Based Infrared System

Mission

- U.S. Strategic Command operators will use the GMD Fire Control System to defend the U.S. territory, deployed forces, friends, and allies against intercontinental ballistic missiles during their midcourse phase of flight.
- The Initial Defensive Capability, Block 04, focuses on defending the U.S. against ballistic missile threats. In future Blocks of the BMDS, Command and Control will transition to the Command, Control, Battle Management, and Communications (C2BMC) system.

Activity

The GMD program is in the development phase. Combined developmental and operational testing included:

- MDA attempted two integrated system-level flight tests, one of which included an attempted target intercept. In both cases, the interceptor failed to launch. These flight test failures led to a restructuring of the test program. MDA chartered:
  - An independent review team to assess the root cause of the failures and associated quality issues
  - A Mission Readiness Task Force to add rigor to the test readiness process and develop a systematic remediation plan for returning to flight testing
- MDA executed an interceptor-only flight test in December 2005 as part of that remediation plan.
- Two flight tests of a target missile provided characterization data for ground-based radar performance assessments.
- GMD conducted four system-level ground tests that continue to provide valuable information regarding system performance.

Six additional test bed interceptors were emplaced at Fort Greely, Alaska. The total number of operational interceptors at Fort Greely is now 10.

Assessment

- In Integrated Flight Tests (IFT) 13C and 14, the operational ground-based interceptors failed to launch. The IFT-13 failure was a software design error in an automated diagnostic check run prior to launch. The IFT-14 failure was due to the missile's lateral support stabilizer's (inside the silo) failure to retract properly. In both cases, the system responded to these indications by correctly aborting the launch.
- Quality, workmanship, and inadequate ground testing have been cited as contributing factors to the flight test failures.
- MDA responded to these findings by appropriately restructuring their test program objectives to emphasize fundamentals and gradually increasing complexity over the next year.
- Future testing objectives stress reliable and repeatable performance.
- Robust testing is limited by the immaturity of some components.
- Ground and flight testing is essential to provide adequate data for validating and accrediting models and simulations.
- Flight tests still lack operational realism. This will remain the case over the next year as MDA implements the findings of the Mission Readiness Task Force and Independent Review Team.
- Test schedules continue to slip. Development of an Integrated Master Test Plan and the creation of the Test Configuration Control Board are both important steps in efforts to control the test program. However, optimistic estimates for the development and integration of a GMD capability result in frequent "fact-of-life" changes to the test schedules.
- Challenging integrated system demonstrations remain an important objective for future testing.
- Developmental testing to date indicates that the GMD system may have some inherent defensive capability against a limited missile attack.

Recommendations

1. Maintain the current commitment to the Mission Readiness Task Force recommendations.
2. Establish an evaluation-driven testing program where the need for data (both developmental and operational) drives the test design.
3. Exploit the deployed architecture of the test bed to maximize data collection to determine the GMD systems operational reliability, availability, and maintainability.
4. Follow the recommendations of the Independent Review Team and Mission Readiness Task Force to:
   - Conduct ground-system tests, built-in-tests, and other tests on both the test bed and sibling components to verify adequate quality, workmanship, and performance
   - Conduct component and subsystem tests according to a disciplined product assurance and test process
   - Conduct extended distributed ground tests that employ operational communications and components.
5. Develop component and system test plans that support model and simulation validation and accreditation.
6. Maximize use of operational hardware, software, and warfighters in system-level testing.
7. Maintain and enforce the newly established test configuration control process.