

## Multiple Kill Vehicle–Raytheon

Delivers volume kill capability to counter complex ballistic missile threats



Counters complex threats during the midcourse phase of flight with multiple kill vehicles launched from a single interceptor.

### Benefits

- Uses same basic kill vehicle design principles as the proven unitary KV designs
- Provides volume kill capability in midcourse phase of flight
- Exploits system data of autonomous kill vehicles and provides redundancy
- Enables scaling to match interceptor payload volume using modular approach
- Integrates on multiple booster vehicle configurations

### Enhancing Midcourse Defense

Rapidly evolving ballistic missile threats and advanced ballistic missile countermeasures are developing and proliferating faster than early estimates, thereby driving midcourse defense weapons systems to pursue volume kill capability. A key element addressing this threat is the Multiple Kill Vehicle (MKV) program. The MKV program is driving weapon transformation to address midcourse discrimination challenges; such as target selection amid uncertainty and the presence of countermeasures. The mission of the MKV is to counter complex threats during the midcourse phase of flight with multiple kill vehicles launched from a single interceptor. Instead of pairing a single kill vehicle with one interceptor, the MKV payloads allow a single interceptor to deliver

several kill vehicles that can attack multiple objects within a complex threat cluster, dramatically increasing the probability of destroying lethal objects.

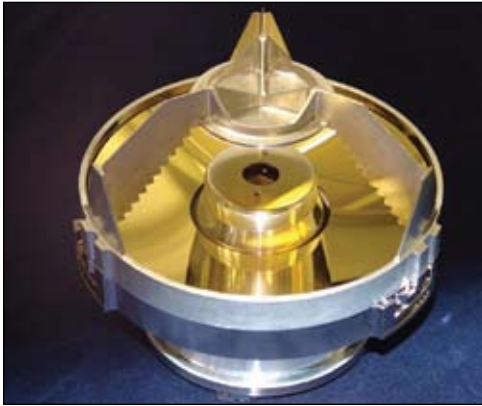
### Raytheon Kill Vehicle Heritage

Raytheon is the only company to have completed development, testing and deployment of exoatmospheric kill vehicles for the Ballistic Missile Defense System (BMDS). MKV–R represents an extension of our unitary kill vehicle heritage, which minimizes development costs while preserving the simplicity and benefits of a unitary design. The MKV configuration increases each interceptor’s lethality. Evolution from unitary kill vehicle heritage yields high technology readiness level (TRL) and high manufacturing readiness level (MRL) subcomponents.

Maximizing the use of high TRL subcomponents offers a low-risk concept for a volume kill capability. Raytheon’s unparalleled experience with exoatmospheric kill vehicles and demonstrated mission assurance is substantiated by delivery of more than 60 space-qualified kill vehicles, yielding more than 19 hit-to-kill intercepts. With more than two decades of kill vehicle design, development and production knowledge, Raytheon’s unique experience ensures the highest confidence in developing the multiple-kill concept.

### Layered Missile Defense

Within the Department of Defense, the Missile Defense Agency (MDA) is responsible for developing and testing the BMDS. Currently, three segments are in development or deployed to support a layered defense: boost phase defense, midcourse defense and terminal



Low-cost pathfinder telescope



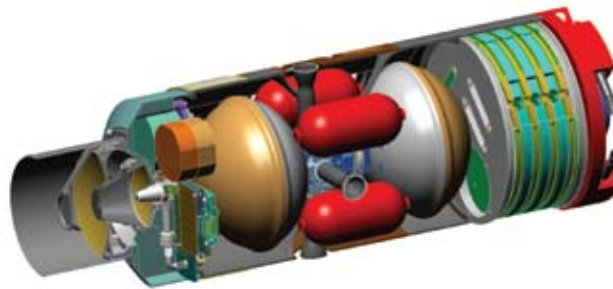
Low-cost radiation-hardened telescope



Low-cost modular sensor assembly

**MKV-R Scalable Approach**

- 2 to n KVs per interceptor
- Passive carrier concept easily adapted to different boosters
  - GBI
  - KEI
  - SM-3



Notional



defense. The Ground-based Midcourse Defense (GMD) segment is designed to protect the U.S. against limited ballistic missile attacks by intercepting them during the midcourse phase of their flight.

**MKV-R Solution**

Raytheon’s MKV program is evolutionary, and its approach is based on proven and fielded kill vehicle technology. MKV-R consists of a number of identical kill vehicles with equivalent capabilities and flexibility in vehicle assignment as the engagement manager. One kill vehicle is assigned as the engagement manager,

communicating battlespace information to the BMDS, while assigning targets and providing kill assessment. All kill vehicles are equally capable of autonomously tracking and intercepting all threats with hit-to-kill accuracy, providing redundancy and eliminating the risk of single point failure. The Raytheon MKV design capitalizes on existing technologies and components resulting in faster development and lower recurring costs. Raytheon’s MKV concept uses a scalable approach, whereby a passive carrier is adaptable to different booster vehicles and can carry a scalable number of

kill vehicles per interceptor. MKV-R will enhance the effectiveness of the Ground-based Midcourse Defense Interceptor (GBI), the Aegis BMD Standard Missile-3 (SM-3), and the future Kinetic Energy Interceptor (KEI). Raytheon technologies and capabilities contribute to BMD via its deployed kill vehicle designs, outstanding discrimination processes and proven endgame lethality. Raytheon’s kill vehicle expertise and infrastructure provides best value for MDA MKV development activities.

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