

## NCADE

### Network Centric Airborne Defense Element



**NCADE is an affordable boost- and ascent-phase ballistic missile interceptor system.**

#### Benefits

- Boost and ascent phase intercept of short- and medium-range ballistic missiles
- Air-launched capability provides mobility and flexibility to counter mobile threats
- Incorporates existing technology and production components to reduce risk and cost
- AMRAAM commonality simplifies integration onto a variety of fighter aircraft and UAVs
- Using AMRAAM infrastructure decreases lifecycle cost

#### Overview

The Network Centric Airborne Defense Element (NCADE) weapon system consists of netted launch aircraft, fire control, cueing and targeting sensors, and interceptors. The interceptors can be launched from manned or unmanned aircraft to provide a quick response to changing battle situations and mobile tactical ballistic missile launchers. This low-risk, boost- and ascent-phase interceptor enables the warfighter to counter both short- and medium-range ballistic missile threats in a cost-effective manner using current airborne platforms.

#### Commonality

NCADE has the same form, fit and interfaces as the Advanced Medium-Range Air-to Air Missile (AMRAAM™) and can be integrated onto current and future aircraft such as the F-15, F-16, F/A-18, F-22 Raptor, F-35 Lightning II, and many international aircraft. NCADE's small size and weight permit

persistent unmanned aerial vehicle (UAV) applications with the integration of the AMRAAM launcher. NCADE also uses a combat-proven imaging infrared seeker that is in production. A nosecone and aerospike protect the infrared seeker during flyout and operation. Targeting can be provided by radar and infrared search and track sensors employed on existing aircraft.

#### Two-Stage Interceptor

The boost- and ascent-phase capability of NCADE is enabled by high-altitude launch and a high-performance two-stage propulsion system. The NCADE interceptor first stage is derived from the AMRAAM rocket motor and control section. The second stage uses a hydroxylammonium nitrate (HAN) fuel for all upper-stage propulsion — including axial, divert and attitude control system — to provide endo- and exoatmospheric flight. HAN is a liquid fuel with very high density and specific impulse. It

is easy to handle and has very low toxicity, which may enable safe shipboard operations.

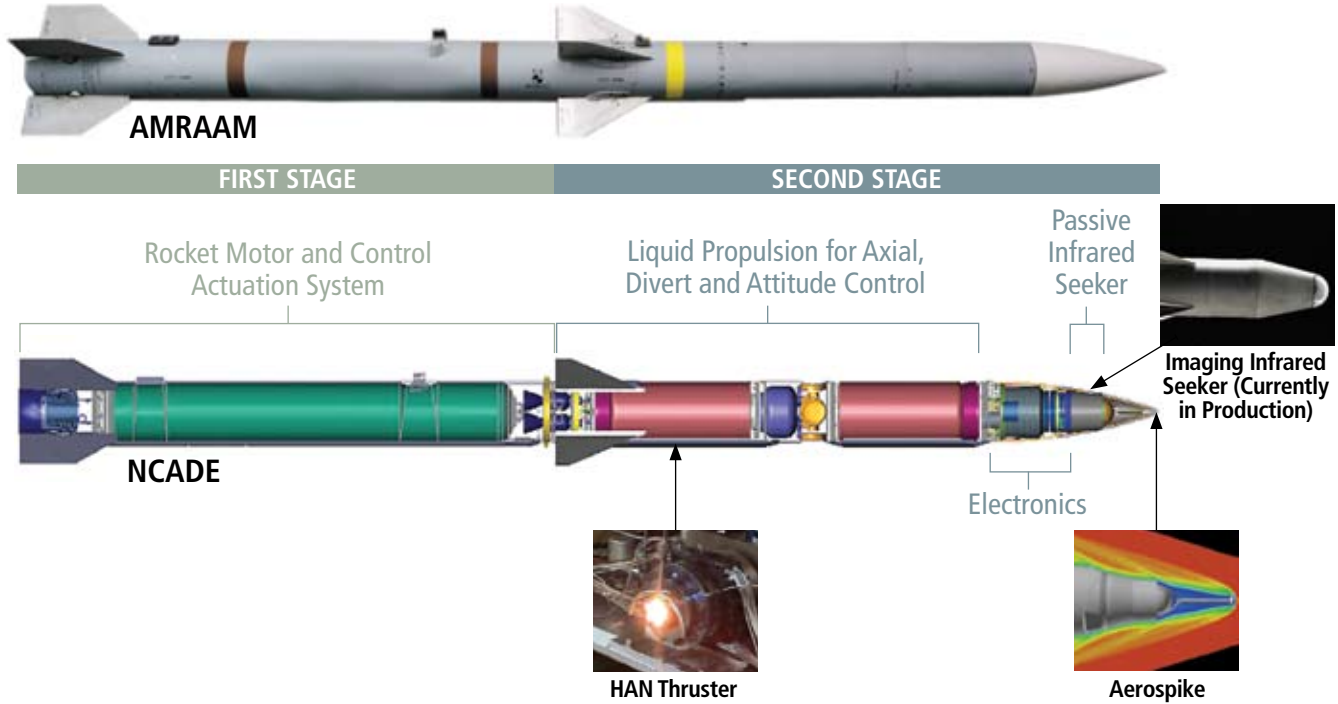
Raytheon is under contract to the Missile Defense Agency (MDA) for NCADE concept development and risk reduction. As part of the NCADE risk reduction program, Raytheon and partner Aerojet tested an advanced HAN thruster that provided more than 150 pounds of thrust for longer than 25 seconds. This test successfully demonstrated what the Missile Defense Agency terms “knowledge points.” Several prototype NCADE seekers have been fabricated and are undergoing ground testing in preparation for a flight test in 2007.

#### Bottom Line

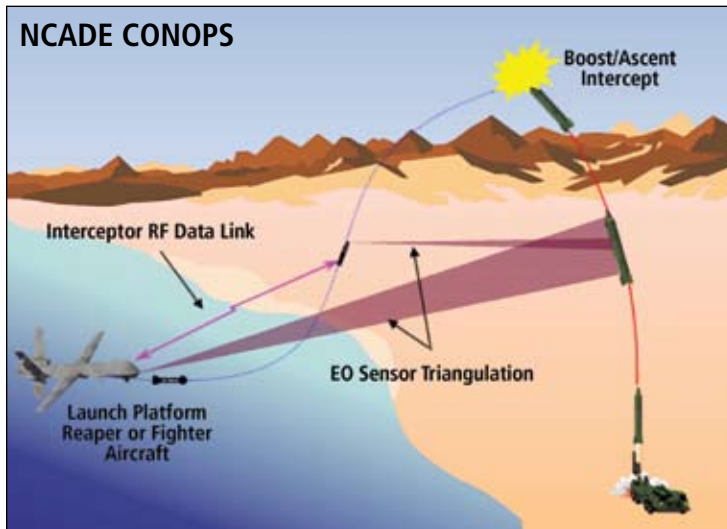
Raytheon's NCADE provides the warfighter with a tactical ballistic missile defense capability quickly, cost-effectively and without new infrastructure.



### Interceptor Configuration



### NCADE CONOPS



NCADE can be used with or without cueing from off-board sensors.

### NCADE Specifications

Interceptor maintains AMRAAM platform-integration compatibility for mass properties and electrical and mechanical interfaces

	AMRAAM	NCADE
<b>Length:</b>	144 in.	144 in.
<b>Diameter:</b>	7 in.	7 in.
<b>Weight:</b>	<356 lb	330 lb

Minimizes new logistics support such as loaders, launchers, depot or storage containers

Raytheon Company  
**Missile Systems**  
 Advanced Missile Defense  
 P.O. Box 11337  
 Tucson, Arizona  
 85734-1337 USA  
 520.794.8185 phone  
 520.794.9226 fax

[www.raytheon.com](http://www.raytheon.com)



Customer Success Is Our Mission