

**NORTHROP GRUMMAN**

DEFINING THE FUTURE

# Northrop Grumman Guardian™ Anti-Missile System Update

**First Anti-Missile Pod to Enter Airline Service in  
DHS Phase III Program**

12 September 2006

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Northrop Grumman Corporation

199-004310

# The Threat is Growing



USMC Photo

## Highly proliferated

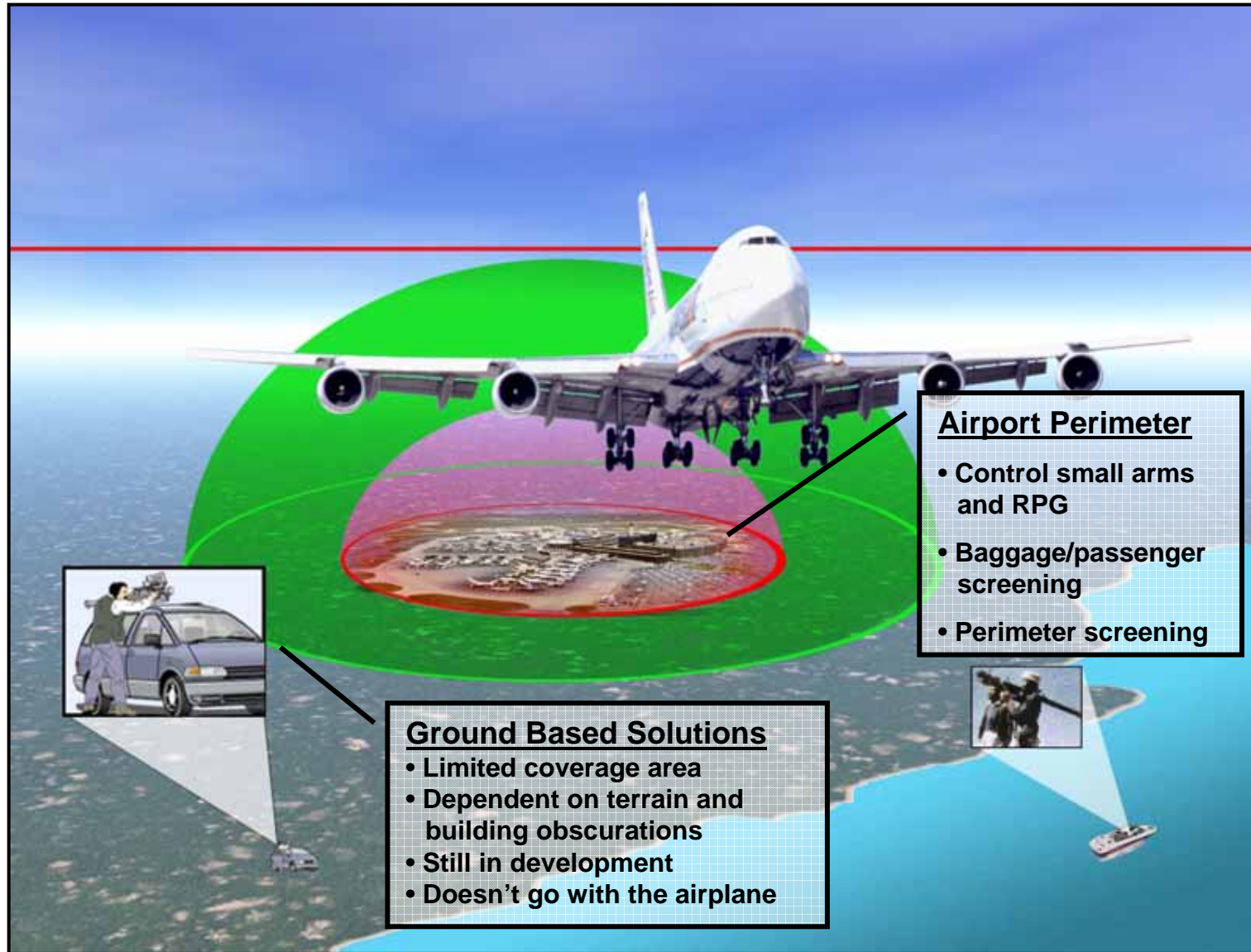
- **Over 500,000 worldwide**
- **Available on black market for \$5,000 to \$80,000**
- **At least 27 terrorist groups have MANPADS**



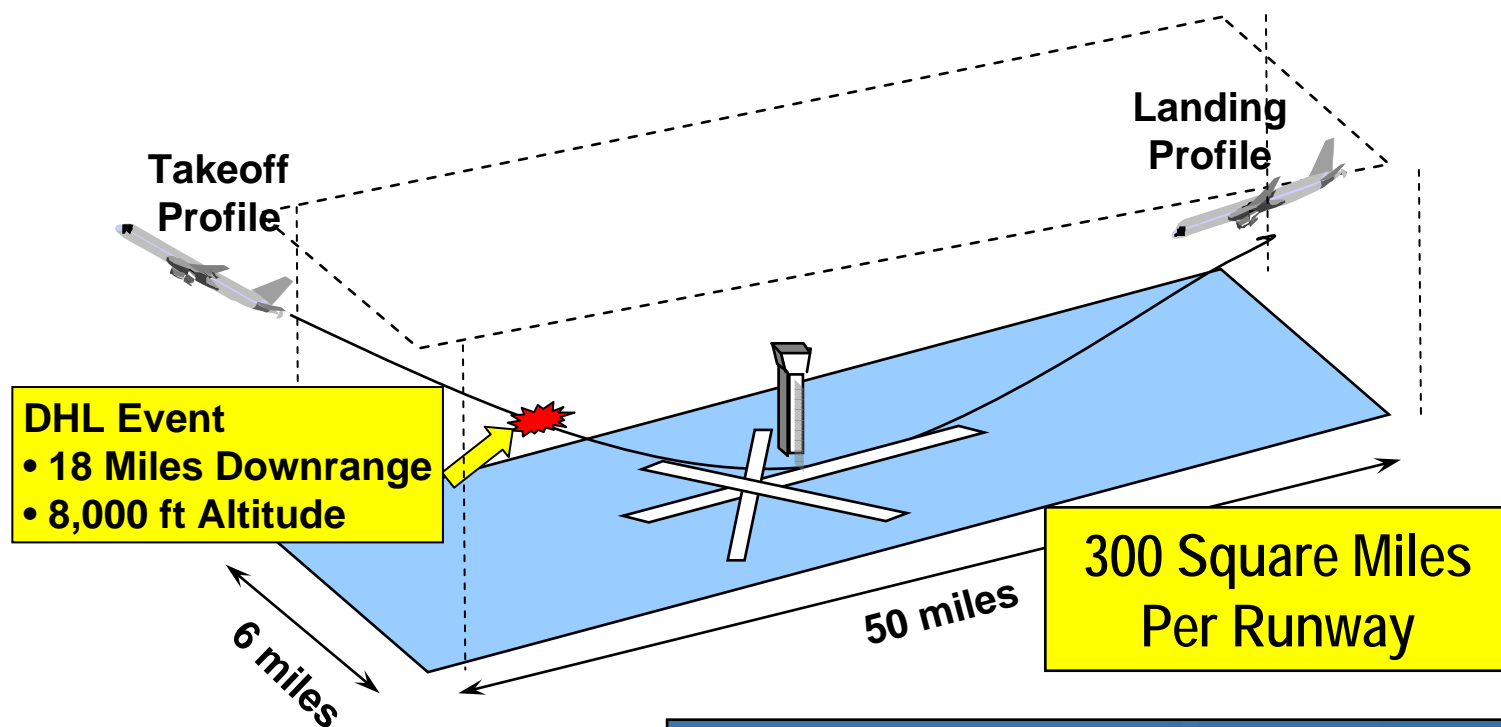
Region	Non-State Group <sup>1</sup>	Location	Type	
			Band I <sup>2</sup>	Band IV <sup>2</sup>
Africa	Armed Islamic Group (GIA)	Algeria		Stinger
	Huta Militiamen	Rwanda	Unspecified	Unspecified
	Uniao Nacional para a Independencia Total de Angola (UNITA)	Angola	Unspecified	Unspecified
	Oromo Liberation Front (OLF)	Ethiopia	Unspecified	Unspecified
	Rwanda Patriotic Front	Rwanda	SA-7	SA-16
	Somali National Alliance	Somalia	Unspecified	Unspecified
United Somali Congress	Somalia	Unspecified	Unspecified	
Asia	Harkat ul-Ansar (HUA)	Kashmir	SA-7	Stinger
	Hizbul Majahideen (HM)	Kashmir		Unspecified
	Khmer Rouge	Thailand, Cambodia	Unspecified	SA-14, Stinger
	Liberation Tigers of Tamil Belam (LTTE)	Sri Lanka	SA-7, HN-5	
	United State Wa Army	Myanmar	SA-7, HN-5	
Europe	Kosovo Liberation Army (KLA)	Kosovo	SA-7	
	Kurdistan Workers Party (PKK)	Turkey	SA-7	Stinger
	National Liberation Army (UCK)	Macedonia		SA-18
Provisional Irish Republican Army (PIRA)	Northern Ireland	SA-7		
Mid-East	Al Qa'ida	Afghanistan	SA-7	Stinger
	Hezbollah	Lebanon	SA-7	Stinger, QW-1
	Kurdistan Workers Party (PKK)	Turkey	SA-7	Stinger
	Palestine Authority (PA)	Palestine, Lebanon	SA-7	Stinger
	Popular Front for the Liberation of Palestine	Palestine, Lebanon	Unspecified	Unspecified
	Taliban	Afghanistan	SA-7	Stinger
South America	National Liberation Army (ELN)	Columbia		Stinger
	Revolutionary Armed Forces of Columbia (FARC)	Columbia	SA-7	SA-14, SA-16

<sup>1</sup> "The Proliferation of MANPADS," *Jane's Intelligence Review*, September 2001  
<sup>2</sup> *Jane's Land-Based Air Defence, 2002-2003; Jane's Electro-Optic Systems, 2002-2003*

# Layered Approach to Airline Protection



# Protection Required Beyond Airport Perimeter

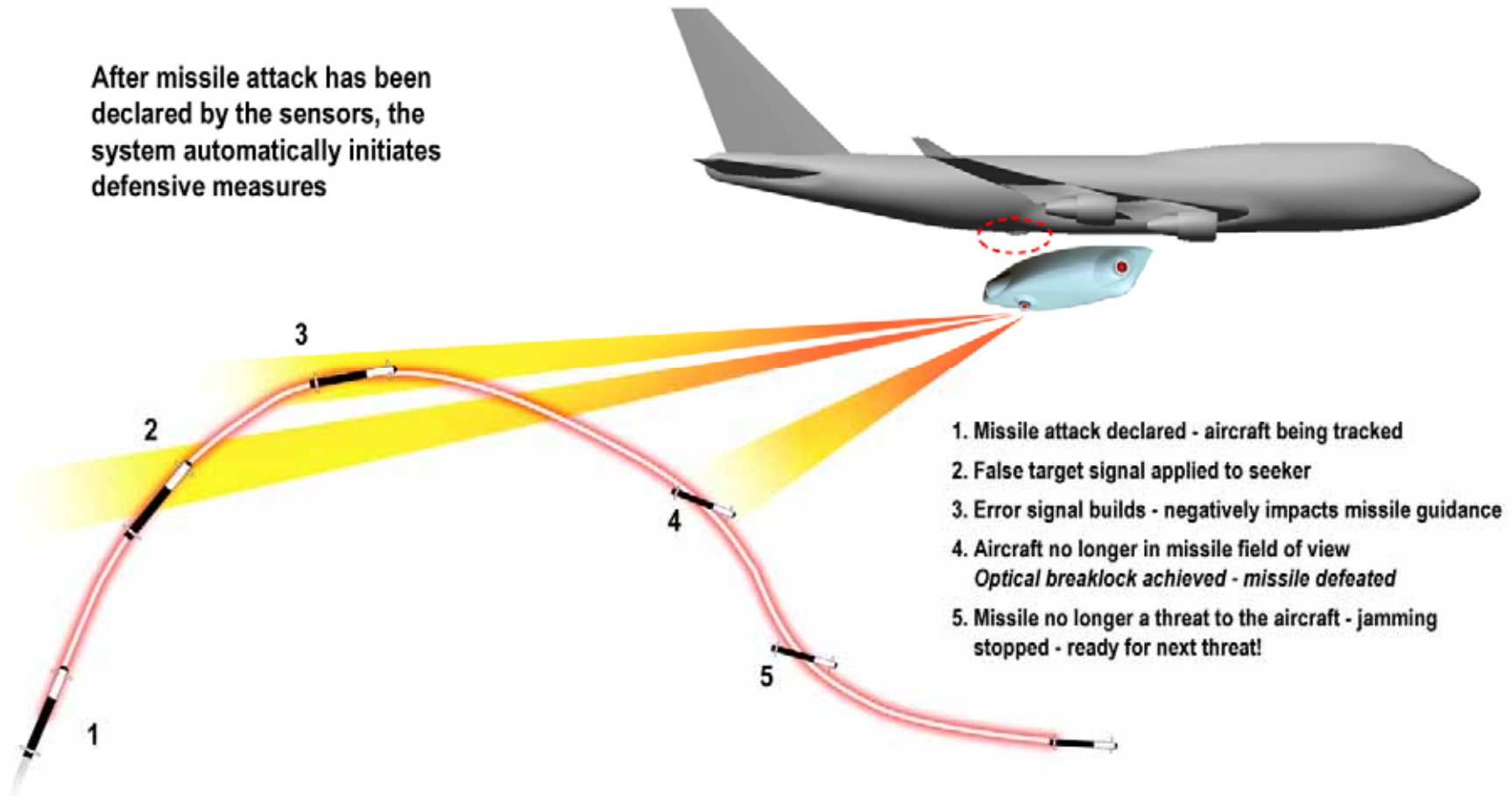


# Fully Autonomous System Operation

## No Operator Intervention

### How It Works

After missile attack has been declared by the sensors, the system automatically initiates defensive measures



1. Missile attack declared - aircraft being tracked
2. False target signal applied to seeker
3. Error signal builds - negatively impacts missile guidance
4. Aircraft no longer in missile field of view  
*Optical breaklock achieved - missile defeated*
5. Missile no longer a threat to the aircraft - jamming stopped - ready for next threat!

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# Proven in Live-Fire Testing

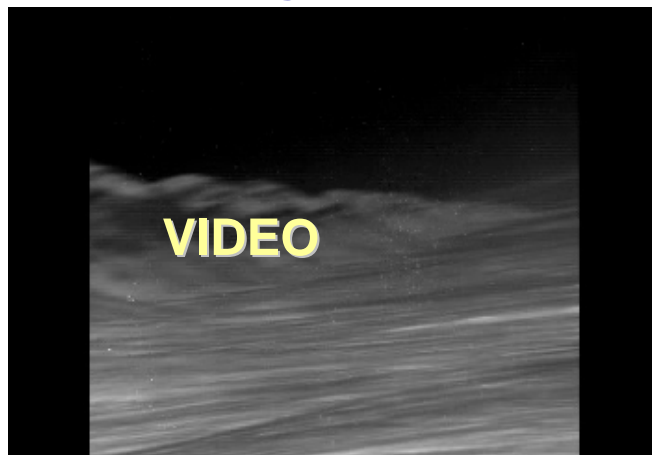
Fully Autonomous System - No Prior Knowledge of Missile Type or Location

No Jamming

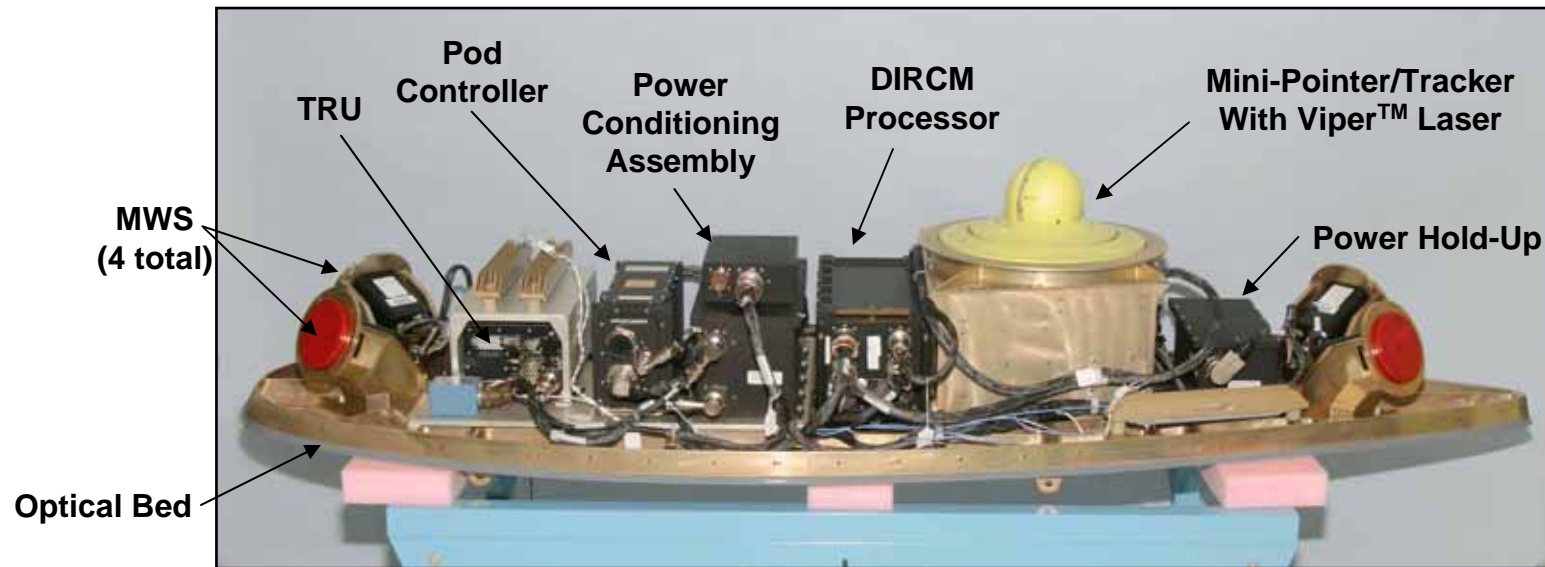


- Laser-based (June-July 2002)
- 21 missile engagements
- 100% jamming effectiveness
- 100% hardware reliability

With Jamming



# Self Contained Pod Based Solution



- **Dimensions: 93" x 32" x 19"**  
(L x W x H)
- **Pod Weight: <500 lb**
  - **Aircraft modifications 40 to 95 lb**
- **Power: 1.8 KVA**



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# Flight Line Installation

- Pod installation on flight line requires four steps:
  - Raise pod to aircraft
  - Connect power and signal connector between aircraft and pod
  - Attach pod to aircraft adapter
  - Run test
- Remove and replace time will be *less than 1 hour*
- Aircraft modification time will be *less than 4 days*



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# Counter-MANPADS Technologies Are in Place Today...

- **Saving Lives Today**
  - Military
    - Combat proven technology
  - International VIP aircraft
- **DHS C-MANPADS Program**
  - Affordable
  - Flexible
  - Functional
  - Designed to meet commercial airline operational requirements



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# Affordability



## System Cost

- DHS not to exceed \$1M per airplane (fly-away)
- Cost equivalent to:
  - International in-flight entertainment system
  - In-flight internet system



## Operating and Maintenance Costs

- CASM \$0.003
  - \$0.70 coast-to-coast cost impact
  - Cost equivalent: A bag of peanuts and soft drink



## System Weight and Power Consumption

- System weight approximately 500 pounds
  - Weight equivalent to about two passengers and their luggage
- System power consumption 1800 watts
  - Consumption equivalent to a consumer hair dryer



# Economic Impact

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- **Prof Detlof von Winterfeldt, USC Report, March 14, 2006**
  - “Risk and Economic Analysis of Terrorism Events”
    - Shutdown of all airports
      - Lave: \$1.5 billion/day
      - USC model: \$1 billion/day
    - 9/11 economic impacts (2 years)
      - Santos and Haimes: \$28-80 billion
      - USC model: \$250-400 billion
- **RAND 2005**
  - “Protecting Commercial Aviation Against the Shoulder-Fired Missile Threat”
    - \$15 - \$50 billion

# Migrating Proven Technology

- ✓ **Only operationally deployed, combat proven, DIRCM system in full rate production**
- ✓ **First installations 1997**
- ✓ **First laser installations 2000**
- ✓ **Over 350 military aircraft installations**
- ✓ **Over 33 aircraft types installed**
- ✓ **DHS Phase II program flight tests complete**
- ✓ **MD-11 FAA certification awarded**
  - **B-747 in process**
  - **MD-10 in process**
- ✓ **DHS Phase III program on schedule**
- ✓ **First aircraft modified and pod installed**