

# GROUND BASED AIR DEFENSE



Ground Based Air Defense (GBAD)

## Program Background

The Marine Corps' organic Ground Based Air Defense (GBAD) capabilities are centered on the Low-Altitude Air Defense (LAAD) Battalions of Marine Air Wings. LAAD battalions currently use the Stinger missile, originally fielded in 1981 and upgraded since to Block I configuration, as its primary weapon system for air defense. It is expected that the Stinger missile will be the primary GBAD asset for the near future, and the missile is currently undergoing a Service Life Extension Program (SLEP) to maintain its operational effectiveness and longevity. An Analysis of Alternatives (AoA) for the GBAD Next Generation Weapon System (NGWS) has recently completed and will result in a Capability Development Document by the end of fiscal year (FY) 2017. In addition to the AoA, there is the GBAD On-the-Move (OTM) FNC project. This program seeks to develop an agile and cost-effective, detect and-engage

capability against low-altitude, observable, and low-radar cross-section air threats.

Programs and projects included in the GBAD portfolio are:

- ▶ Stinger Missile SLEP
- ▶ Advanced Man-Portable Air Defense (A-MANPADS) System Increments 0 & 1
- ▶ Stinger Night Sight Replacement
- ▶ Identification Friend or Foe (IFF) Mode IV Replacement
- ▶ GBAD NGWS

## Program Status

### Stinger Missile SLEP

A Stinger Missile SLEP began in FY14 and is scheduled to complete delivery in FY18. The SLEP is essential and required to meet the War Reserve Munitions Requirement and to provide sufficient training rounds after 2019. The SLEP is a joint effort with the Army's Program Executive Officer – Missile System to prolong the life of the Stinger Missile by replacing aging components such as the flight motors and missile energetics.

### Advanced Man-Portable Air Defense (A-MANPADS) Increments 0 & I

A-MANPADS was designated an Abbreviated Acquisition Program (AAP) in 2005 and is executing a single-step to full capability acquisition strategy by integrating commercial off-the-shelf (COTS) and NDI subsystems. The concurrence to pursue the full Approved Acquisition Objective for Increment I of 38

Section Leader Vehicles (SLV) and 143 Fire Unit Vehicles (FUV) was received in 2015. A-MANPADS Increment I vehicles contains hardware and software for a tactical data link capability, which allows the LAAD BN to connect to various C2 agencies to receive an air picture down to the LAAD Fire Teams. The fielded datalink capability is supported by a Joint Range Extension Sustainment contract that was awarded in September 2013 for five years. An Engineering Change Proposal (ECP) has been approved for all A-MANPADS FUVs, which will be transitioning to a HMMWV Prime Mover platform to rectify obsolescence and operational deployability of the current chassis. Included in this ECP is the replacement solution for the Harris Communication secure tactical wireless capability, SECNET-11, which has reached obsolescence and is being replaced with the AN/PRC-152A radio. A follow on ECP is planned to transition the current SLV capability to the same HMMWV Prime Mover platform.

### **Stinger Night Sight Replacement**

The AN/PAS-18 Stinger Night Sight is being replaced in a joint acquisition with the Army through the Army's Family of Weapon Sights – Crew Served development and production efforts. The future optic will be replaced with a state-of-the-art, high-definition Focal Plane Array (FPA), providing greater target resolution and detection capability against the full spectrum of threats to include UASs.

### **IFF ModeV**

GBAD plans to procure a replacement IFF system in a joint acquisition with the Army to meet a Joint Requirements Oversight Council requirement to be Mode V capable and compliant by 2020. The effort will replace the current AN/PPX-3B analog interrogator with a new digital Mode V interrogator, which can operate with Stinger Missile or Army Avenger system. Efforts will include AIMS box level and platform integration testing.

### **GBAD**

The GBAD Program Office is currently

investigating potential kinetic and non-kinetic capability to counter the full spectrum of threats to include UASs. Efforts include the GBAD On-the-Move (OTM) Future Naval Capability program, funded by the Office of Naval Research and developed by Naval Surface Warfare Center, Dahlgren, VA. This effort is investigating the feasibility of hosting a directed energy solution on tactically relevant vehicles such as the Joint Light Tactical Vehicle (JLTV) or High Mobility Multipurpose Wheeled Vehicle (HMMWV).

## **GBAD's Top Technical Issues**

### **1. Counter Unmanned Aircraft System (UAS)**

Based on the proliferation of inexpensive Low, Slow, and Small (LSS) Unmanned Aircraft System (UAS); a cost effective kinetic and/or non-kinetic counter UAS capability is required to negate the threat at the system's weapon keep out or sensor ranges. The counter UAS system should provide a low cost per shot system with a high probability of kill against a group 1 UAS. Three technologies are currently being sought after to counter UASs.

- ▶ **Missile System:** A small, low cost missile that is capable of countering UAS threats.
- ▶ **Radio Frequency Jammer:** A lightweight integrated detect, track, identify, and defeat capability that can react to emerging technologies to address new threat sets. The system should either allow the user to reconfigure the defeat capability to address varying threats or do it automatically.
- ▶ **Laser:** A more stable beam director and a better dual axis gimbal are required to concentrate the amount of power on target. An improved tracking software that eliminates or compensates for the cone of confusion within the radar capability.

To compliment a lower cost per shot defeat system, a miniaturized radar that is capable of being mounted onto a lightweight tactical vehicle which provides azimuth, elevation, and

distance while on the move is necessary to better detect and track UAS systems.

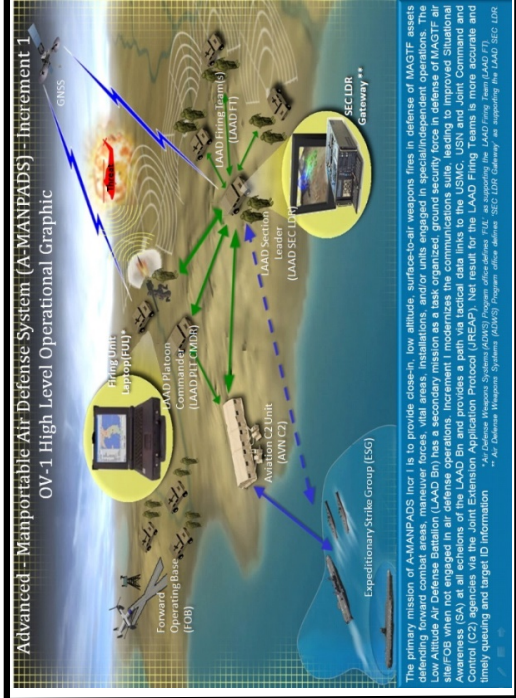
## **2. Stinger Night Sight Replacement**

Enabling technologies are needed to produce a lightweight, compact night sight, compatible with the stinger missile and suitable to achieve detection and identification of thermal targets (i.e. Type 1-3 UAS, rotary/fixed aircraft) at ranges suitable for man-portable air defense operation. Technologies required are 1) lightweight, quiet, and efficient micro chiller that can be incorporated into a hand held Mid Wave IR (MWIR) thermal sight; 2) High Density Focal Plane Array (FPA) (16:9 ratio of 1280 or 1920 horizontal pixels) with small 12 micron or smaller pixel pitch; and 3) lightweight compact optical zoom that provides a 20-degree Field of View (FOV) for missile engagement and narrow FOV for target identification.

# GBAD

**Description:** A-MANPADS provides low altitude air defense against fixed/rotary wing, cruise missile and emerging UAS threats. It utilizes the Joint Range Extension Application Protocol (JREAP) capability to provide a tactical air picture for the LAAD gunner's defense of MAGTF High Value Assets (HVAs). The Fire Unit Vehicle (FUV) and Section Leader Vehicle (SLV) comprise primary mobile platforms for the system.

<u>Key Events</u>	<u>Program Status</u>
<ul style="list-style-type: none"> <li>Designated an AAP in 2005</li> <li>IOC DEC 2012</li> <li>Tracking Head Trainer initial production 2QFY17</li> <li>FUV PCA 3QFY17</li> <li>Delivery of first M1114 FUV production systems 4QFY17</li> <li>STINGER SLEP missile delivery FY18</li> <li>FOC 1Q FY20</li> </ul>	<ul style="list-style-type: none"> <li><b>FUV:</b> Meeting performance metrics and NSWC Crane meeting the adjusted M1114 FUV fielding schedule. Schedule was adjusted to incorporate ECPs.</li> <li><b>SLV:</b> M1114 SLV development schedule delayed 10 months as a result of adjustments to the FUV fielding schedule.</li> <li><b>Stinger Missile:</b> Stinger Blk I missiles undergoing Army sourced Service Life Extension Program (SLEP) to bridge the gap in assets until a more capable GBAD Future Weapon System is fielded.</li> </ul>

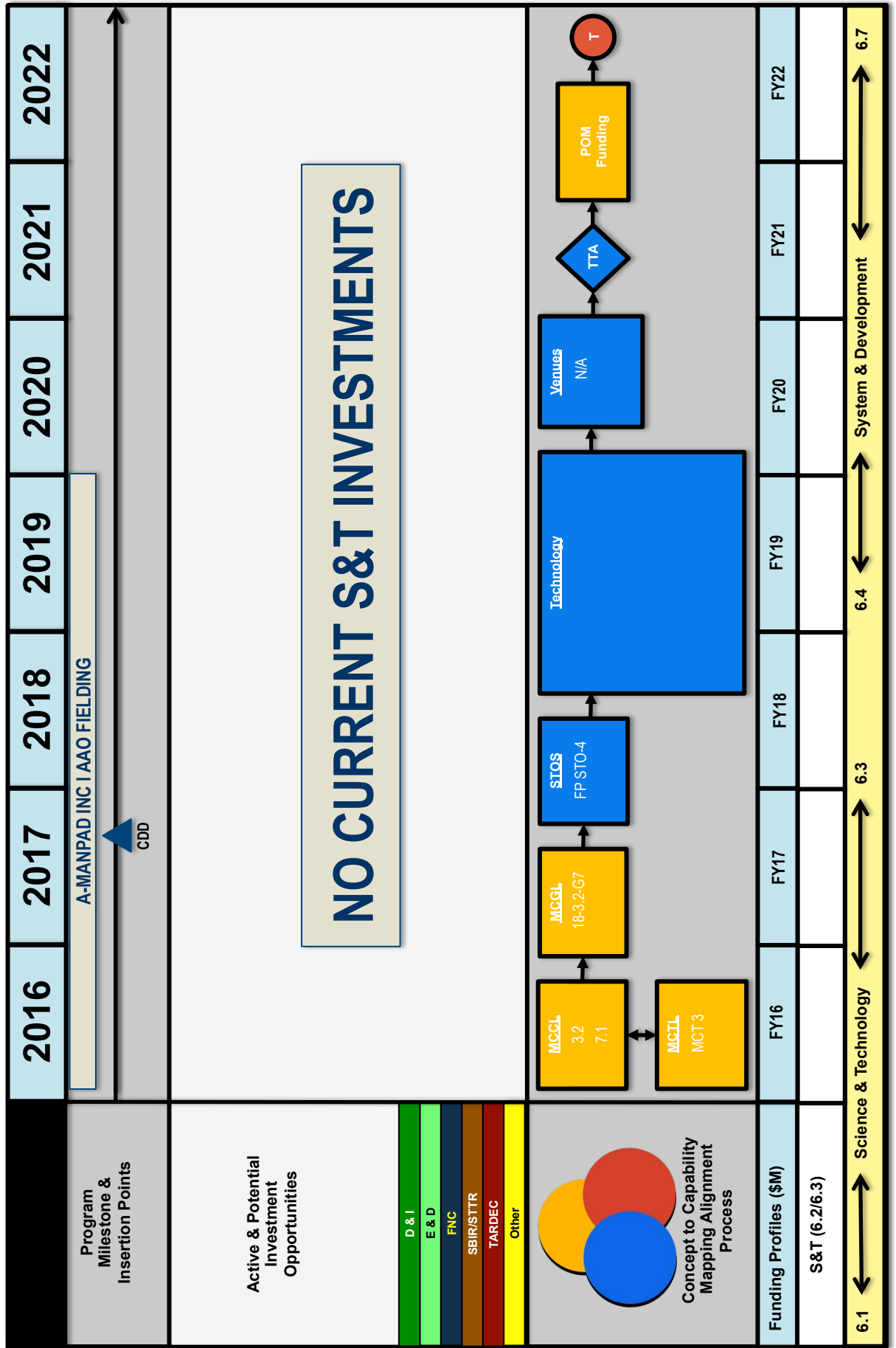


The primary mission of A-MANPADS (Inc 1) is to provide close-in, low-altitude, surface-to-air weapons fires in defense of MAGTF assets defending forward combat areas, maneuver forces, vital areas, installations, and/or units engaged in special independent operations. The Low Altitude Air Defense Battalion (LAAD Bn) has a secondary mission as a task organized, ground security force in defense of MAGTF air sites/OS when not engaged in air defense operations. Increment 1 modernizes the communications suite leading to improved Situational Awareness (SA) and an improved LAAD Bn and provides a path to the LAAD Bn and Joint Command and Control (C2) via an improved Expeditionary Strike Group (ESG) and Joint Range Extension Application Protocol (JREAP). Note: For more information on the A-MANPADS program, visit the program website at [www.dau.mil/AMPS](http://www.dau.mil/AMPS). For more information on the LAAD program, visit the program website at [www.dau.mil/LAAD](http://www.dau.mil/LAAD).

PROGRAM	PRIOR	FY16				FY17				FY18				FY19				FY20				FY21				FY22			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Milestones & Phases																													
SETR Reviews	A-MANPADS FUV/SLV Prime Mover Design																												
Test Events	FNC ATD																												
Contract Events	Aerial Targets IFF Optics Stinger SLEP Datalink A-MANPADS FUV/SLV IFF Optics Datalink																												

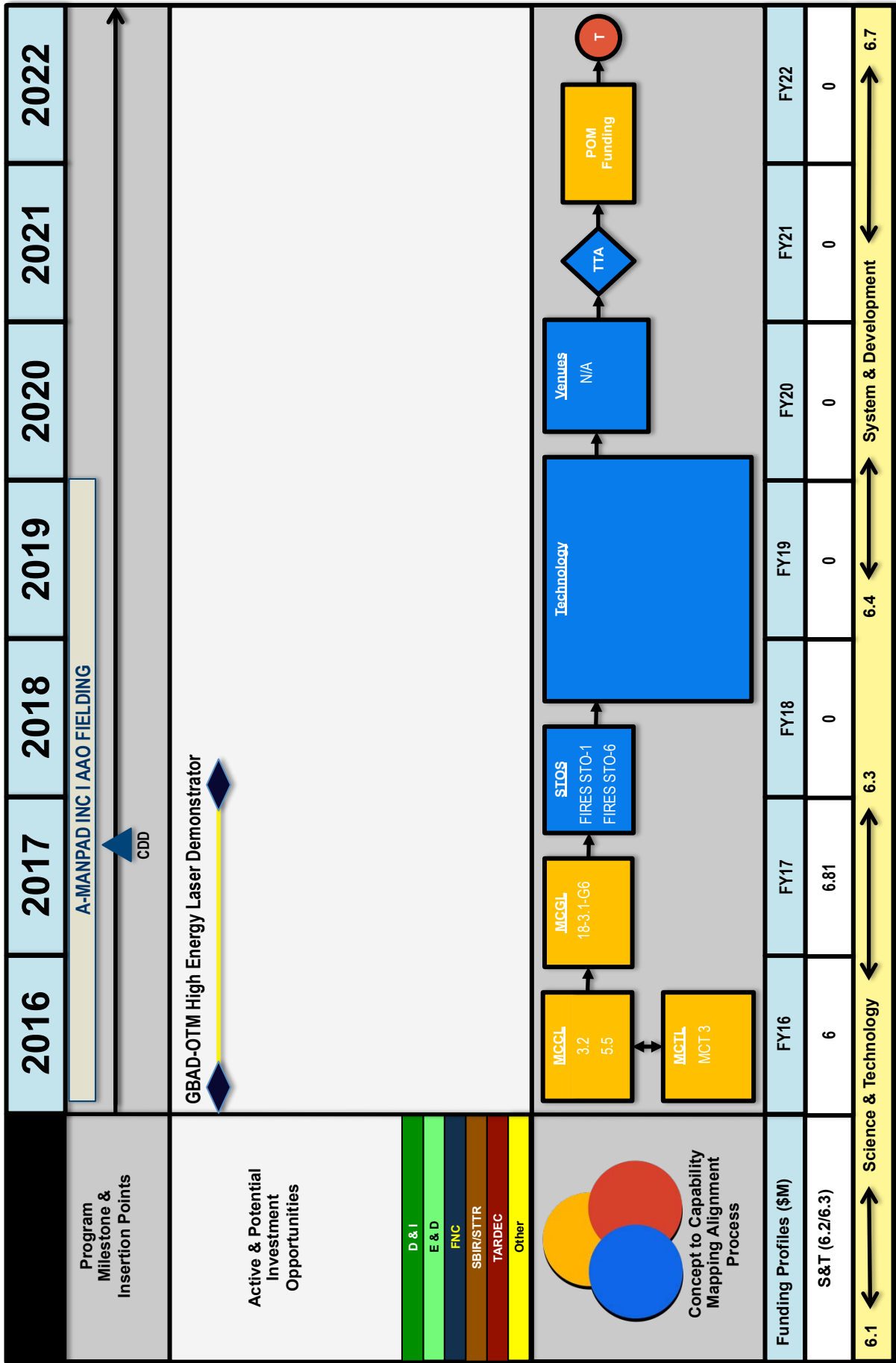


# GBAD Technical Issue #1 Stinger Night Sight Replacement





# GBAD Technical Issue #2 Counter Unmanned Aircraft System (UAS)





# GBAD Technical Issue #3 Secure Wireless Communication

