Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
2003		**00-00-2003 to 00-00-2003**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Old Becomes New...Airships are out of the box	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Army Space & Missile Defense Command,Army Forces Strategic Command,Redstone Arsenal,AL,35809**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**2**	

Old Becomes New ...

Airships are out of the box

Michael M. Lee serves in the U.S. Army Space and Missile Defense Command's Space Technology Directorate. His professional experience includes radar technology development at the U.S. Army Missile Command and the PATRIOT Project Office, Lead Engineer for the In-Flight Interceptor Communication System for National Missile Defense, and the Transition Manager of the High Altitude Airship (HAA) Advanced Concept Technology Demonstration (ACTD). He was a key participant in the effort resulting in the approval of the HAA ACTD for initiation in FY03.

By Michael M. Lee

Over the next decade, the transformation of the U.S. military will continue at a rapid pace. Homeland defense, terrorist threats, near-competitor nation states, the spread of high technology weapons, and the proliferation of weapons of mass destruction make it imperative that our military develops new technologies to transform itself into an organization capable of countering these threats. One emerging technology being demonstrated is actually an innovative use of an old technology — airships. Combining the old airship concepts with modern sensors and communications equipment transforms these ideas into the emerging technology of a high altitude airship (HAA). This article describes the capabilities of the HAA: its military utility as an alternative to Space platforms (such as satellites) and unmanned aerial vehicles (UAVs), its potential as a communication relay, and its possible use by other government agencies.

The HAA is a Department of Defense FY03 Advanced Concept Technology Demonstration (ACTD), with a projected demonstration completion in FY07. The Missile Defense Agency is conducting the ACTD. The U.S. Army Space and Missile Defense Technical Center is supporting the ACTD as the technical lead for payloads and transitioning of the airship to a follow-on program. The objective of the ACTD is to demonstrate the engineering feasibility and potential military utility of an unmanned, un-tethered, gas-filled airship that can fly at 65,000 feet. The prototype airship will be capable of continuous flight for up to a month while carrying a multi-mission payload. The ACTD payload weight is 4,000 pounds and payload power is 10 kilowatts. The ACTD is intended as a developmental step toward an objective HAA that can self-deploy from the continental United States to worldwide locations (Figures 1 and 2) and remain on station in a geostationary position for a year (or more) before returning to the United States for service at fixed ground launch and recovery areas. The objective HAA may also increase in payload weight and power. These potential improvements will be determined during the course of the ACTD.

The HAA payload bay will house a variety of payloads supporting multiple missions and providing multiple capabilities to the warfighter. These missions include, but are not limited to, intelligence, wide-area surveillance, psychological warfare, communication relay, Space control, missile defense, and blue (friendly) force tracking. One way to better understand the HAA concept is to consider it as a "high mobility multipurpose wheeled vehicle (HMMWV) in the sky." Like the HMMWV, the payload will determine the mission that the HAA supports. Areas under investigation during the ACTD include the use of the HAA as a surrogate Space platform, as a surrogate UAV, and as a communication relay platform.

Examination of the HAA as an alternative to a Space platform or a UAV reveals that all three provide significant on-station time over an area of interest and all three are capable of carrying a variety of payloads. Generally speaking, the HAA falls in between the on-station time of a UAV (measured in hours or days) and a satellite (measured in years). However, the HAA is not envisioned as a replacement for the UAV or satellite, each of which has its own unique capabilities. Deployability, transit time to theater, logistical support, and operational/tactical employment concepts must all be considered in determining the type of aerial platform required for a given mission. For short duration missions, a UAV may be adequate. For a mission requiring an asset to be on station for years, perhaps a satellite is required. However, a distinct advantage of the HAA is its ability to provide a cost-effective alternative to UAVs and satellites.

In comparison studies between the UAV and HAA (where both conduct the same type of mission), one HAA provides the same capability as four UAVs, with the cost of the UAV life cycle being three times as much as

Figure 1

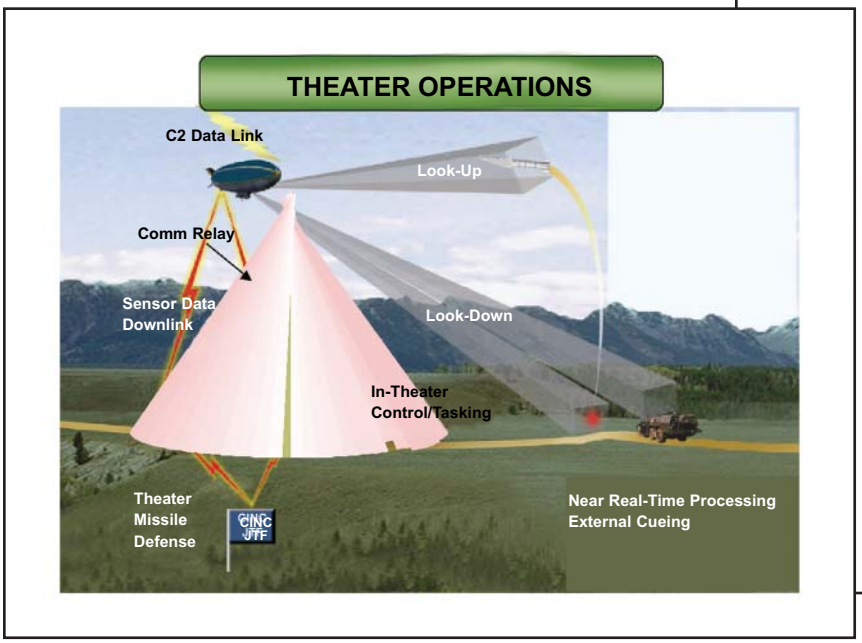
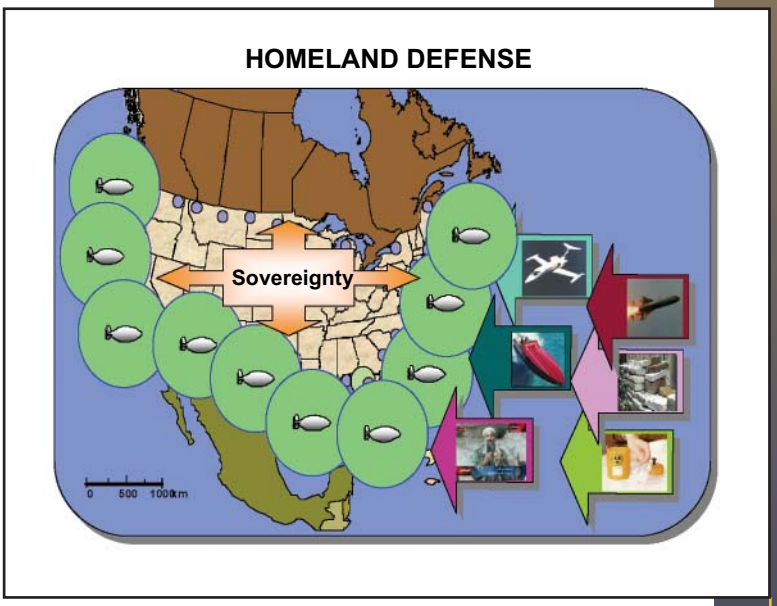


Figure 2

Figure 3



an HAA. This results in a 12:1 value for the HAA over the UAV. In a comparison study between the HAA and a generic satellite conducting a 24/7 mission over a specified area, approximately 50 satellites would be needed for one HAA. The resultant cost would be 50 or more times as much as an HAA — resulting in example of substantial value for the HAA. In a budget-constrained environment, these studies illustrate the fiscal rationale of using HAAs, but only if they meet the warfighter's mission requirements.

Another possible HAA perspective mission is as a communications relay platform. The Army is very interested in over-the-horizon communication relay and wide area surveillance. The Navy is very interested in servicing carrier groups for over-the-horizon communication relay. An aerial relay platform provides several advantages over ground-based relays. The HAA is less manpower intensive, immune from ground and artillery attack, and has a reduced logistics footprint. The HAA could also be deployed sufficiently to the rear of the theater for immunity from surface-to-air missile attacks. An example is the current communication relays in Korea. One HAA with the proper communication payload could replace all the communication relays currently located in the South Korean mountains. Not only would this improve the over-the-mountain communications, but it would also reduce requirements for ground facilities, personnel, force protection, and logistics support.

Given its continuous, geostationary, long endurance, large payload characteristics and its significant cost benefits, the HAA provides tremendous capability not only for the military but for other government agencies. For example, the Department of Homeland Security and NORAD are interested in cruise missile wide area surveillance (Figure 3). Also, the Drug Enforcement Agency is interested in border security wide area surveillance and blue (friendly) force tracking. Other potential users are providers of commercial communication relays. All of these possibilities must be explored before the full potential of the HAA can be realized.

As the military transforms, the HAA provides a flexible, cost-effective platform to meet the wide variety of missions required by the military, from homeland defense to major combat operations. The HAA is an example of the innovative thinking required to transform the military. The HAA's use of modern sensors and communication equipment provides the commander an alternative to Space platforms, UAVs, and communication relays. As research continues, more "out of the box" uses of the HAA may be developed.