

Assuring Resilient Space: Small Satellites and Associated TPED

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The 2010 National Space Policy directs the U.S. space community, comprised of the Department of Defense (DOD), Intelligence Community (IC), Military Services and NASA to examine our nation's ability to conduct space-based Intelligence, Surveillance and Reconnaissance (ISR) and communications even during a period of "peer state" and "near peer state" attacks intended to deny us our advantages we accrue from our use of space systems.

DOD and the IC's past experience is largely one of building small numbers of extraordinarily capable and expensive ("exquisite") satellites for communications and ISR. As potential adversaries continue to develop cyber-attack capabilities and have demonstrated an ability to kinetically attack spacecraft, the vulnerability of our architecture is now a serious concern.

In addition, the sluggish U.S. economy, the draw down and pull back from a decade of combat operations, and other factors have combined to force a significant reduction in DOD and IC spending over the coming decade(s). Simultaneously, DOD and the IC have a growing awareness that the long lead times and long mission duration of the "exquisite" space assets can lead to fielding technologies that become obsolete and mission limiting.

Some DOD and IC leaders are now examining alternative architectures to provide lower cost, flexible, more diverse and rapidly launched space systems. Government leaders are considering commercially hosted payloads in geosynchronous orbits and smaller, lower cost, free flying government and commercial satellites in low earth orbits to perform what has traditionally been a government owned and operated ISR environment.

In addition, changes to the ground tasking, processing, exploitation and dissemination (TPED) systems are needed to ensure commercially hosted payloads or new small satellites have end-to-end mission capability and are thus able to meet emerging needs such as ease of tasking, multi-INT processing, and more advanced distribution mechanisms (e.g., to users on the move).

Today, the majority of IC leaders and their subordinate program managers believe that only large, expensive systems can truly answer requirements and provide reliable services. Champions for change to smaller, lower cost systems must demonstrate that technology and commercial business practices have evolved to the point that smaller, low cost, and *adequate* performance is now achievable as a supplementary or complementary role to larger systems, particularly in matters of dire need such as an attack on our national assets or a tactical operation in an area without airborne ISR readily available.

This AMOS poster presentation explains both sides of the debate and offers ideas for how to introduce smaller satellites and associated TPED solutions without incurring significant risk to existing missions.



Freedom to Think Forward



Assuring Resilient Space

SMALL SATELLITES AND ASSOCIATED TPED

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Alignment with National Military Strategy

- ▶ Principal Mission Areas
 - › Counter Terrorism & Irregular Warfare
 - › Deter & Defeat Aggression
 - › Project Power Despite Anti-Access/Area Denial
 - › Counter Weapons of Mass Destruction
 - › Operate Effectively in Cyberspace and Space
 - › Maintain a Safe, Secure, and Effective Nuclear Deterrent
 - › Defend the Homeland and Provide Support to Civil Authorities
 - › Provide a Stabilizing Presence
 - › Conduct Stability and Counterinsurgency Operations
 - › Conduct Humanitarian, Disaster Relief, and Other Operations
- ▶ Key Investment Areas
 - › Special Operations Forces
 - › ISR Systems
 - › Unmanned Systems
 - › Space Capabilities
 - › Cyberspace Capabilities
 - › Capacity to Quickly Mobilize if Necessary

Policy, Funding, Technology & Strategy

- ▶ National Space Policy 2010
 - › "Develop and exercise capabilities and plans for operating in and through a degraded, disrupted space environment for the purposes of maintaining mission essential functions"
- ▶ Costs of large legacy systems in an era of declining budgets
- ▶ Difficulty inserting new technology rapidly with legacy approaches
- ▶ Manned and unmanned ISR over flight with impunity not assured
- ▶ Rapid global force projection from sanctuary requires rapid global ISR support
- ▶ Technology advances in small satellites and launch systems

Not Just a Collection Issue

- ▶ End-to-End Solution Required
 - › Tasking
 - › Make it user friendly and available directly to/from the operator
 - › Processing
 - › On board the collector, at the ground station and with the operator via smart user tools
 - › Exploitation
 - › Simpler user defined applications
 - › Dissemination
 - › Directly to and from the end user, including on the move
 - › Multi-sensor/multi-INT
 - › Value added for each INT is increased when integrated
 - › Correlate small sensor output with other higher quality/accuracy data

Summary Business Case

- ▶ Small satellites can conduct supplementary and complementary missions with respect to larger legacy systems
- ▶ Small satellites trend is for reduced costs with growing performance
- ▶ Permits far superior technology refresh cycles
- ▶ Small satellites must fit in customers' architectures and exhibit ease-of-use
- ▶ Emphasize needed on an end-to-end, T-C-PED approach
- ▶ Leverage Multi-INT

United States Geospatial-Intelligence Foundation Small Satellite Working Group Formed