

NANOSAT/MICROSAT CONSTELLATIONS AND THE NEXT GENERATION UNMANNED SYSTEMS STRATEGY

Small Sat Conference

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UAS & Small Sats – A Pattern For Proliferation

- In 2000 DOD had 50 UAV's, Initial UAV mission by 2009 that number had grown to 6800
- Factors contributing to UAV proliferation
 - Cost Manned ISR too costly
 - Access Expendable systems
 - Manpower Reduce crew size
 - Long Dwell No crew
 - Change to Tactical ISR



- Overwatch
- Persistent Tactical ISR



50

2010

- Today there are less than 50 Small Sats (Nanosats/microsats) in the DOD inventory
- Factors that will contribute to Small Sat proliferation
 - Cost Budget constraints vs. global issues
 - Access Anti Access Area Denial (A2AD), Airspace constraints
 - Manpower Reduce theater footprint
 - Global Coverage worldwide issues
 - Lower Echelon ISR cost and tech enabled
- Initial Small Sat mission Applications Global Small Scale Contingency Operations (SSCO)
 - Beyond Line Of Sight (BLOS) Tactical Communications
 - Tactical Tag Track Locate
 - Wide Area Tactical Search ISR
 - UAS Tipping, Cueing and Augmentation for the warfighter







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Beyond Line of Sight Communications





Current Issues

- Insufficient quantities of Airborne communications relays
- Area access limitations restrict availably to dismounted, disadvantaged users
- Clandestine tactical operations Tipping
- Saturated SATCOM bandwidth limits lower echelon access to BLOS communications
- COCOM communications requests not equally met

Operational Concept

- Provide constellations of small sats to satisfy large numbers of simple BLOS communications requirements targeting dismounted, disadvantaged users
 - Tactical Unattended Ground Sensors (UGS) data exfiltation to the Warfighter
 - Text, Simple Images, email, preformatted combat messages
 - Ship to Ship, Ship to Shore communications

Why Small Sats

- Small sats equipped with software defined radios can provide data relays with sufficient bandwidth to enable the warfighter to receive BLOS FBCB2 data and UGS sensor data
- Low cost small sats enable service ownership reducing demand on limited availably airborne systems, SATCOM and allowing allocation to lower echelons.

Tag Track and Locate Nanosatellite Constellation





Operational Concept

Deploy networks of small sats at LEO to enable a global or targeted grid of TTL receivers

Current Issues

- Cost effective, ubiquitous, global warfighter Tag Track and Locate
- GPS denied environments triple canopy, container ships, parking garages
- Limited capability in Anti Access Area Denied (A2AD) environments
- Clandestine warfighter operations Tipping

Why Small Sats

- Low cost networks provide cost effective alternate to conventional systems
- Lower orbits provide better performance
- Global access
- Survivable constellation of small sats reduce or eliminate clandestine tipping

Integrated Architectures





Current Issues

- Manned / Unmanned tactical ISR is sub-optimal for wide area surveillance (WAS)
- Strategic airborne WAS systems are too few and to costly to provide persistent, ubiquitous coverage
- Limited wide area surveillance systems available for tactical tipping and cueing
- Responsive, time sensitive target (TST) ISR / TTL collection

Operational Concept

- Provide small sat Wide Area Search (WAS) tipping and cueing to tactical UAS
- Provide multi-int constellations for persistent A2AD, IPB and disadvantaged user ISR and communications
- Augment UAV architectures to provide gap fillers and time critical C4ISR
- Collect and disseminate UGS data

Why Small Sats

- Small Sat fields of regard are by design wide area by comparison to tactical UAV's
- Small sats will provide a cost effective force multiplier for tactical UAV's and UGS's
- Launch on demand to reconstitute or augment time sensitive target / AOI coverage
- Lower probability of detection and less vulnerable to anti-sat weapons for anti access operations



The same capabilities that spurred UAS growth,

- Persistence
- Access
- Relevance to the tactical warfighter

when applied to a global theater, are the catalysts that will drive small sat integration and proliferation over the next ten years

Small sats will change the way services develop, organize, and employ UMS across the full spectrum of operations and will need to be considered when developing the next generation unmanned systems strategy.

