The First U.S. Army Satellite in Fifty Years: SMDC-ONE
First Flight Results

9 August 2011

25th Annual AIAA/UTU Conference on Small Satellites

Mr. John London
Responsive Space Tech Div
Space & Cyberspace Tech Dir
Technology Center
john.london@smdc.army.mil
256-955-5287

Distribution A – Approved for Public Release; Distribution Unlimited.
Miniature Electronics Revolution Changed ConOps as Well as Providing New Capability

We believe Nanosatellites can provide intel & comm to previously unreachable forces. We’re conducting technology demos to validate this thesis.
SMDC’s NanoSatellite Initiatives

**SMDC-ONE**
- 4kg Mass Cubesat - $300K Each
- Data Exfil / Over-The-Horizon Comms
- 8 Flight-Ready Satellites Designed and Built in One Year
- 1st Launch 8 Dec 2010

**Kestrel Eye**
- 15 kg Mass - $1M Each
- 1.5m Imagery Resolution
- Tasked from Theater
- Launch 2012

**Soldier Warfighter Operationally Responsive Deployer for Space (SWORDS)**
- Low-Cost Launch Capability - $1M to Orbit
- Augmentable with ATACMS / MLRS Motors
- Target Vehicle, Sensor Testing, Long Range Strike
- Responsive Nanosat Orbital Launch
- Innovative yet Simple Design Approach
- 60 second 1st Stage Test 18 June 2010
SMDC-ONE

Program Description: Technology demonstration of low cost nanosatellites that can provide tactical communications and data exfiltration relevant to the tactical ground component warfighter

2008-2009

Hardware and Software Built:
• 8 flight qualified satellites
• 2 qualification satellites
• 3 ground stations
SMDC-ONE ConOps Example
SMDC-ONE Subsystem Layout

- Deployable Antenna Turn Styile
- Receiver Phase Splitter
- Hysteresis Rods
- RF Filter
- Permanent Magnet (Attitude Control)
- Thermal Radiator
- End Cap Solar Panel
- Power
- Flight Computer
- Umbilical Board
- Payload
- Solar Cells
- Transmitter Phase Splitter
- PCB Subassembly
SMDC-ONE First Flight

• Launched 8 Dec 2010 on Falcon 9
• SMDC-ONE flew as a secondary
  ➢ Deployed in low 35 day orbit
  ➢ CubeSat placed in 34.5 deg inclination with Huntsville at ~34.5 deg N Latitude
• First Army satellite launched since October 1960
• Down linked state-of-health data from cubesat on first pass
• Exchanged files between Huntsville and Colorado Springs 1000 land miles away
• Operated solely by in-house SMDC personnel
• Successful exfiltration of unattended ground sensor (UGS) data
SMDC-ONE First Contact

First Contact with Colorado Springs

First Contact with Nanosatellite
SMDC-ONE Accomplishments

Obtained solicited data from the satellite at the Huntsville ground station on the satellite's first revolution

Transferred data files between Colorado Springs & Huntsville ground stations

Consistently obtained state-of-health data from the nanosatellite

Transferred files between Colorado Springs & Huntsville included text to/from SMDC/ARSTRAT Commander LTG Formica, jpegs (images), & simulated ground sensor data

• Obtained megabytes of sensor & mission data from the satellite over a month
• Performed actual data exfiltration of military unattended ground sensors on Redstone Arsenal demonstrating capability of adding technical demonstration to the testing well after satellite was delivered for launch & even after launch
• All ground operations handled by on-site Army team
SMDC-ONE Orbital Altitude
(Launch 8 Dec 10; Reentry 12 Jan 11)
Summary

SMDC Technology Center has multiple responsive space projects that will conduct technology demonstrations over the next 3 years.

We are engaged with Government, Industry & Academia partners to reap the benefits of this rapidly progressing technology area.

Nanosat technology can augment traditional capabilities.

We have already committed the remaining SMDC-ONE satellite buses.

Stay tuned!