Advancing Small Satellite Access to Space for Developers and Launch Providers

Justin Carnahan
Mission Manager
Justin.Carnahan@tyvak.com
Tyvak Nano-Satellite Systems, Inc.

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Tyvak Company Background and Overview

• Tyvak was created to address unfulfilled and growing CubeSat needs
  – Advanced “Next Generation” CubeSat Components & Complete Vehicles
  – Provide Complete Program Life-Cycle Expertise and Mission Development

• Wide range of products and services
  – From feasibility studies to launch services

• Quick response and low cost solutions
  – Focus on value-added work to maintain low operating cost Infrastructure

• Blend of Creativity and Proven Engineering Expertise
  – Team experienced in all areas of space business, from CubeSat to large government programs
Tyvak Launch Services

- Tyvak team benefits from 15 years of launch experience at Cal Poly
  - First launch in 2003
  - Successfully Completed 18 Launch Campaigns
    - 121 CubeSat integrated, 72 Dispensers
    - 10 Different launch vehicles and 9 ranges worldwide
  - 5+ Launch Campaigns Ongoing
    - >40 CubeSats, >25 Deployers

NASA NPP with 3 P-PODs  NROL-39 with 8 P-PODs
Integration Flight Heritage Summary

• Launch Vehicles
  – Arianespace Vega
  – Eurockot Rockot
  – Kosmotras Dnepr
  – Orbital Sciences Minotaur 1
  – Orbital Sciences Minotaur 4
  – Orbital Sciences Taurus XL
  – SpaceX Falcon 1
  – SpaceX Falcon 9
  – ULA Atlas V
  – ULA Delta II

• Space Ports
  – Vandenberg Air Force Base, USA
  – Cape Canaveral Air Force Station, USA
  – NASA Wallops Flight Facility, USA
  – Reagan Test Site, Kwajalein Atoll
  – Kodiak Launch Complex, USA
  – Guiana Space Centre, Kourou
  – Baikonur Cosmodrome, Kazakhstan
  – Yasny Launch Base, Russia
  – Plesetsk Cosmodrome, Russia
Launch Pace

• Reliable point of access to space for secondary payloads
  – US and International Missions
  – ULA, SpaceX, Orbital, Kosmotras, etc.

• CubeSat integrator for most US Gov. Missions
  – Air Force, NASA, etc.
Taking the Next Step: Interplanetary Access for CubeSats

• Tyvak with working with NASA LSP, NASA JPL, and ULA to pioneer Interplanetary Access for CubeSats
• First ever interplanetary mission will be MarCO, a pair of 6U CubeSats developed by NASA JPL launching March 2016
Launch Interfaces

• Tyvak is currently working with launch providers developing standard interfaces to baseline secondary payload capability for more launches
• Focus on providing the most flexible interfaces, providing more opportunities for more payloads
  – Rails, Tabs, Propulsion, other advanced capabilities
• The wide range of CubeSat deployer systems that Tyvak can access enable launch capability across launch platforms
  – 1U, 3U, 12U, Interplanetary, Nano Launch Vehicle
Tyvak and CubeSat Work Flow

CubeSat Developer

Spacecraft specs
Test results

Tyvak
Manifesting documents
Launch readiness Package

Licensing

LV
CubeSat Focus

- The CubeSats will work to the CubeSat to Dispenser ICD

- Tyvak leverages a number of deliverable templates to simplify flight certification documentation
  - Safety, ICD Verification, Testing
CubeSat Delivery and Integration Flow

CubeSats Delivered to Integration Facility In California

Post-Delivery Checkout (Functional Checkout, Battery Charging)

Physical measurements on CubeSats using CubeSat Acceptance Checklist (CAC)

CubeSat to P-POD Integration

Delivery to Launch Site & Integration to Launch Vehicle

Launch
Launch Opportunities

• Over 215U of Launch Capacity
• Wide Range of Future Launch Opportunities to Fly You Payload by 2017

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Launch and Satellite Insurance

- We offer insurance services on major U.S. and International Launch Vehicles
  - Competitive rates and favorable payment terms
  - Simple and efficient process and contract
- Any satellite from the smallest CubeSat to a SmallSat in the 10’s of kg can get insurance
  - Comprehensive package for reducing financial risk and providing piece of mind
  - Can cover the full cost of the launch, typically the largest single expensive in a small satellite budget
  - Can cover the full cost of replacing the satellite, including COTS subsystems

http://tyvak.com/launch-insurance/
Questions?

More Information at:
Tyvak.com/tls/
Tyvak.com/launch-insurance/

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