14th Small Satellite Conference

CubeSat Deployment Services
• 51.6 degree inclination, 385 – 400 KM
• Orbit lifetime 8 – 12 months
• Deployment typically 1.5 months after berthing
• Each NRCSD can deploy up to 6U of CubeSats

• 8 NRCSD’s per airlock cycle, for a total of 48U deployment capability

• 2 Air lock cycles per mission
1. NRCSDs transported in CTBs
2. Launched by ISS visiting vehicle
3. NRCSDs installed by ISS Crew
4. JEM air lock depress & slide table extension
5. Grapple by JRMS
6. NRCSDs positioned by JRMS
8. JRMS return NRCSD-MPEP stack to slide table; Slide table retracts and pressurize JEM air lock

9. ISS crew un-install first 8 NRCSDs; repeat install/deploy for second set of NRCSDs
NanoRacks CubeSat Mission (NR-CM3)

- Orbital Sciences CRS-1
- Planet Labs Flock1A, 28 Doves
- Lithuanian Space Assoc., LitSat-1
- Vilnius University & NPO IEP, LituaniaSat-1
- Nanosatisfi, ArduSat-2
- Southern Stars, SkyCube
- University of Peru, UAPSat-1

- World’s largest remote sensing constellation
- Most CubeSats launched in a single mission
- Two countries attain space faring status
- Innovative on-orbit sensor lease model
- Kickstarter
• NR-CM3
• Orbital Science CRS-1, Launch Jan 9, 2014
• Air Lock Cycle 1, Feb 11-15, 2014
• Deployers 1-8 (all Planet Labs Doves)
• NR-CM3
• Orbital Science CRS-1, Launch Jan 9, 2014
• Air Lock Cycle 2, Feb 25-28, 2014
• Deployers 9-14 (Planet Labs Doves)
NanoRacks CubeSat Mission (NR-CM4)

- Orbital Sciences CRS-2
- Planet Labs Flock1B, 28 Doves
- NASA Ames, TechEdSat-4
- Taylor University, GEARRS
- MIT-Lincoln Labs, MicroMAS
- San Jose University, Lambdasat

- World’s largest remote sensing constellation – get’s bigger!
- Innovative re-entry technology
- Concept to flight hardware 92 days
- First passive microwave radiometer in a CubeSat
- First space-based graphene experiment
Schedule and Program Requirements

Scheduling (L-/+ months)
• L-9 Initial data call
• L-4, L-2 Safety Reviews
• L-1.5 Customer delivery
• L-1 NanoRacks deliver to NASA
• L+1-1.5 Deployment (typical)

NanoRacks Requirements
• Battery flight acceptance test
• Electrical: 3 inhibits minimum
• Customer responsible for spectrum & remote sensing licensing
• Fault-tolerance for deployables
• Non/low toxicity materials
• Secondary locking features
Availability and Pricing

Availability
• OSC Antares/Cygnus

Pricing
• $86,000 per Unit
• Inclusive: safety, off-gas, vibe
• Volume discounts available
• Payment milestones:
  30% @ contract signing,
  40% Phase 3 safety review,
  30% @ deployment
Acknowledgement

And our Customers!

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