

Orbital Antares Demonstration Mission



Image of Spaceflight's ISIPod Testing prior to mating to Cygnus Mass Simulator

Spaceflight Overview

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- Spaceflight founded in 2010
- Our mission is to provide routine low cost access to space by simplifying the launch integration process
 - Standardized interfaces
 - Commercial list pricing for services
 - Regular flight opportunities on a range of vehicles
- Spaceflight currently has more than ten payloads under contract to launch across five different Launch Vehicles
 - Soyuz
 - Antares
 - Dnepr
 - Falcon 9
 - ISS
- Spaceflight has successfully deployed five payloads



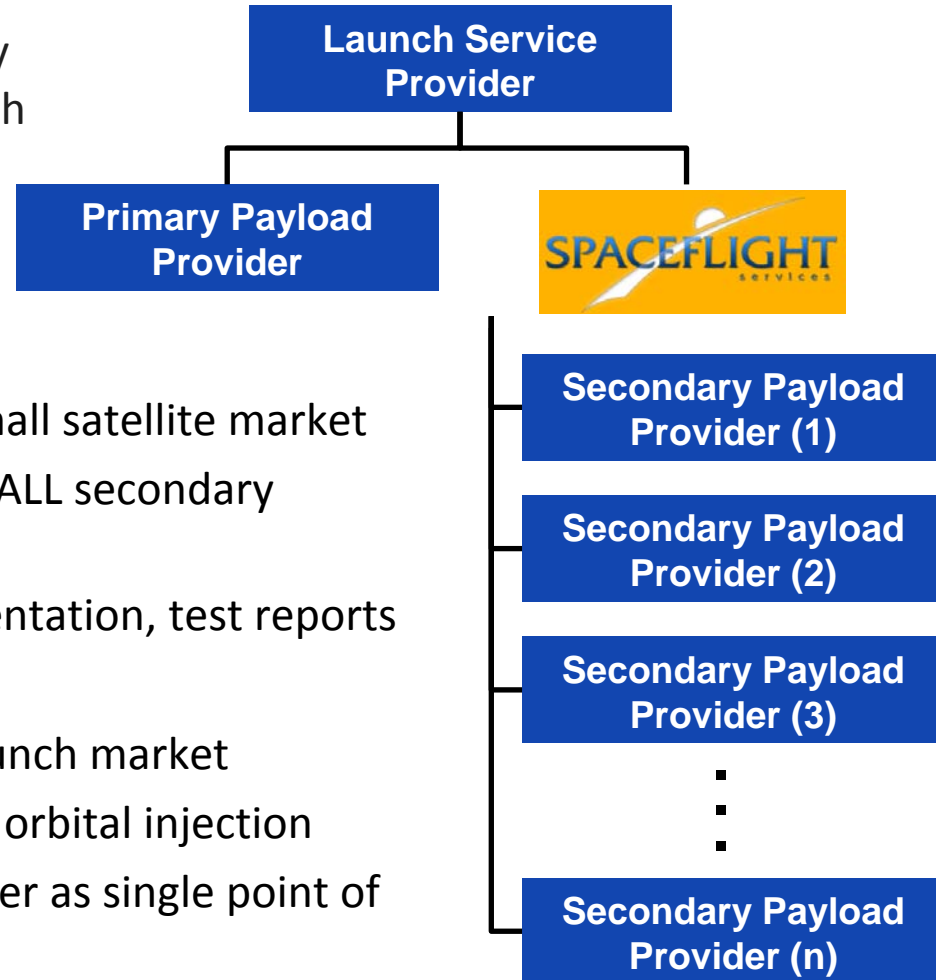
Deployed Orbital Payloads



Hosted Payloads

Our Model

Arrange launch opportunities for secondary payloads by contracting directly with Launch Service Providers and Secondary Payload Providers.



Benefits for Launch Service Providers

- Spaceflight provides broad access to small satellite market
- Experienced party as representative of ALL secondary payloads (negotiation with single party)
- Standardized interface control, documentation, test reports

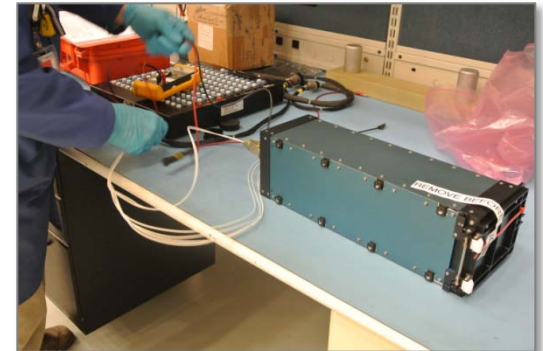
Benefits for Satellite Developers

- Established relationships with broad launch market
- Fully arranged launch, from contract to orbital injection
- Experienced party representing customer as single point of contact
- Experienced payload integrators with existing dispensers and interfaces

Spaceflight provides a single focal point for launching your satellite: from mission planning through contract signing, payload integration, launch and orbit insertion

- Provide satellite customers with a wide variety of launch opportunities
- Contract for launch services
- Conduct Mission Management
 - Engineering Analysis
 - ITAR and Export/Import Support
 - Launch Vehicle Provider interface
- Perform Secondary Payload Certification
- Integrate Secondary Payload with Launch Vehicle
- Manage / fabricate the Launch Vehicle interface
- Deliver your payload to the desired destination

Prepare Payloads for Flight



Integrate with the Launch Vehicle



Provide Access to Space



Spaceflight launched two ISIPODs on the Orbital Sciences Antares maiden flight (A-ONE)

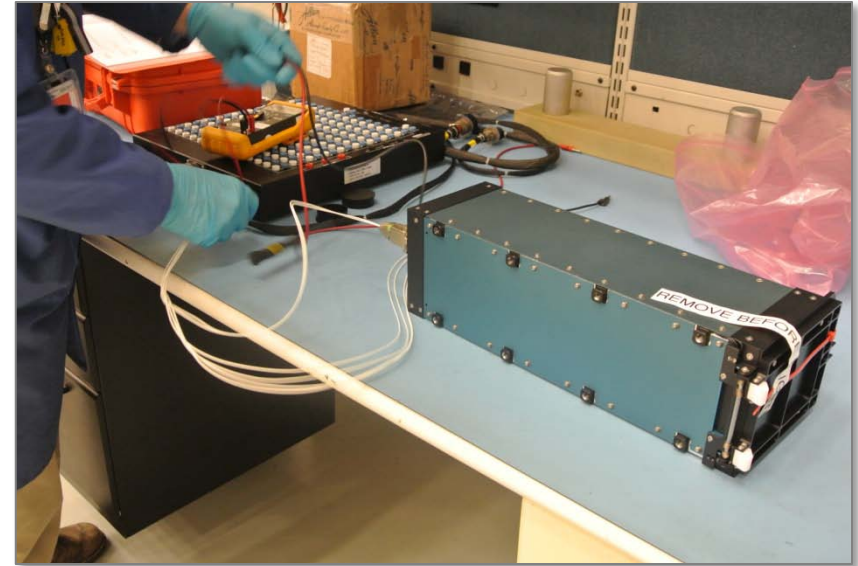


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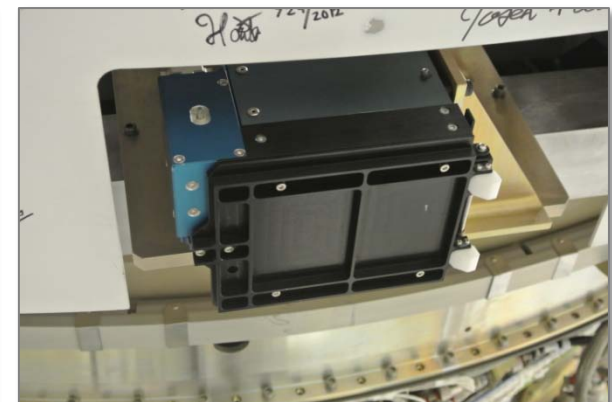
- Spaceflight worked with Orbital to integrate the two ISIPODs and conduct functional testing
- Payloads:
 - NASA Ames Research Center – 3x PhoneSats (1U)
 - Cosmogia Inc – Dove 1 (3U)



ISIPOD from inside mass simulator



ISIPOD from outside mass simulator

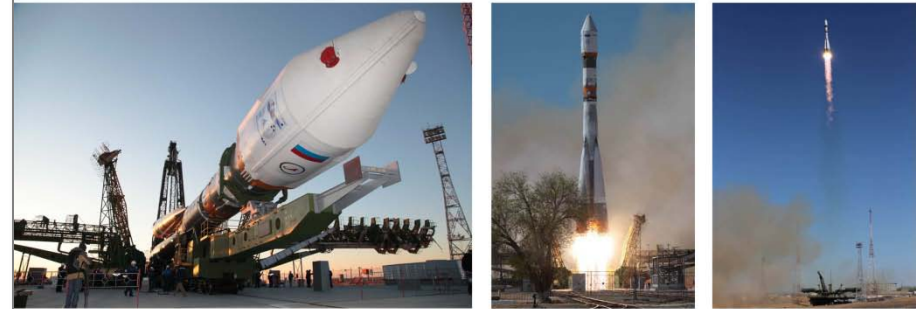
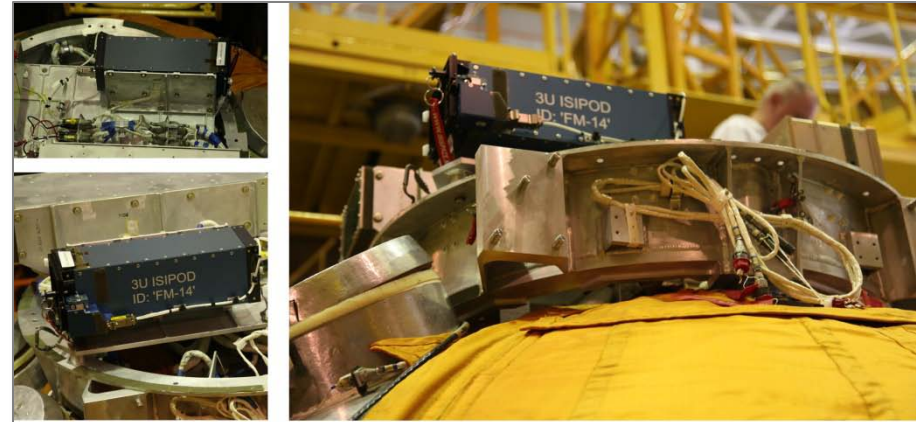


ISIPOD ready to go

- On April 21, 2013 the A-ONE vehicle successfully deployed two Spaceflight ISIPODs carrying four CubeSats



- Working with our partners ISL of the Netherlands, Spaceflight manifested and launched an ISIPOD and deployed Dove-2 for our customer Cosmogia, Inc.



Commercial Mission List Pricing

- Spaceflight commercial pricing based on payload size and mass
- We arrange launches for secondary payloads ranging from CubeSats to MicroSats
- Commercial mission pricing from Low Earth Orbit to Low Lunar Orbit



Soyuz 2.1a / Bion-M1 Launch

Payload Type	Containerized Payloads				MicroSat Class		
	1U	3U	6U	12U	50 kg	180 kg	300 kg
Length (max) cm	10.0	34.0	36.6	36.6	80	100	125
Height (max) cm	10.0	10.0	10.0	22.6	40	60	80
Width (max) cm	10.0	10.0	22.6	22.6	40	60	80
Mass (max) kg	1.0	5.0	10.0	20.0	50	180	300
Price – Orbital (LEO)	\$125k	\$325k	\$595k	\$995k	\$1,750k	\$4,950k	\$6,950k
Price – Orbital (GTO)	\$250k	\$650k	\$995k	\$1,950k	\$3,250k	\$7,950k	\$9,960k
Price – Orbital (GSO / LLO)	\$490k	\$995k	\$1,990k	\$3,250k	\$6,500k	\$15,900k	\$19,900k

Launch Availability (as of April 2013)

Date (CY)	Orbit	Type	Containerized Payloads				MicroSat Mass		
			1U	3U	6U	12U	50 kg	180 kg	300 kg
H1 2014	600 km circular, 52°	US	Y	Y	Y	Y	Y	Y	Y
H1 2014	575 km circular, 65°	Russian	Y	Y	Y	Y	Y		
H1 2014	400 km circular, 51.6°	US	Y	Y	Y	Y	Y		
Q2 2014	600 km circular, SSO	Indian	Y	Y	Y	Y	Y	Y	Y
Q3 2014	L2 Transfer Orbit, 51.6°	Russian	Y	Y	Y	Y	Y	Y	Y
Q4 2014	600 km circular, SSO	US	Y	Y	Y	Y	Y	Y	Y
H2 2014	600-830 km circular, SSO	Russian	Y	Y	Y	Y	Y	Y	Y
Q4 2014	600-700 km circular, SSO	Ukrainian	Y	Y	Y	Y	Y	Y	Y
H2 2014	400 km circular, 51.6°	US	Y	Y	Y	Y	Y		
H1 2015	600-830 km circular, SSO	Russian	Y	Y	Y	Y	Y		
H1 2015	390 km circular, 63°	Russian	Y	Y	Y	Y	Y		
H1 2015	400 km circular, 51.6°	US	Y	Y	Y	Y	Y		
Q2 2015	600 km circular, SSO	US	Y	Y	Y	Y	Y	Y	Y
Q3 2015	720 km circular, SSO	US	Y	Y	Y	Y	Y	Y	Y
H2 2015	GTO / GSO / LLO	US	Y	Y	Y	Y	Y	Y	Y
H2 2015	1500 x 39000 km, 61°	Russian	Y	Y	Y	Y	Y		
H2 2015	600-830 km circular, SSO	Russian	Y	Y	Y	Y	Y	Y	Y
H2 2015	400 km circular, 51.6°	US	Y	Y	Y	Y	Y		
H1 2016	500-600 km circular, SSO	US	Y	Y	Y	Y	Y	Y	Y
H2 2016	1500 x 39000 km, 61°	Russian	Y	Y	Y	Y	Y		
H1 2017	600 km circular, 52°	US	Y	Y	Y	Y	Y	Y	Y
H1 2017	600 x 60000 km circular, 52°	US	Y	Y	Y	Y	Y	Y	Y

Spaceflight has experience and demonstrated track record with helping US payloads fly on foreign launch vehicles

- **Export Controls and Restrictions**

- TAA required by the ITAR for all US payloads launched outside the US
- May rule out US payloads on some launch vehicles
- Consequence of violation of ITAR
 - Potential ban from launching US payloads

- **Space Debris Mitigation Rule (the 25 Year Rule)**

- All payloads must be down within 25 years
- Limiting altitude at which small sats can be launched

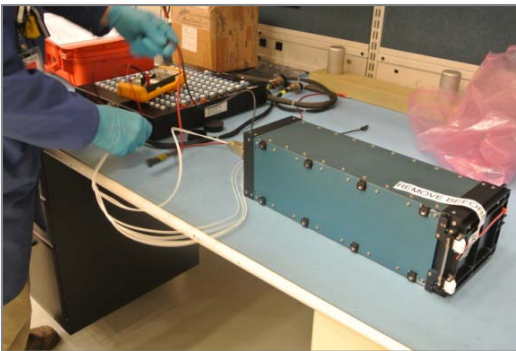
- **Licensing and Registration of Space Objects**

- Ultimate Registration by ITU
 - Country specific registration varies by jurisdiction

- **Liability Limitations for Objects Launched to Space**

- Varies by Country

- Access to space for secondary payloads is expanding!
- Launch Service Agreements with Orbital Sciences, Roskosmos, Kosmotras and SpaceX
- Payload Delivery Agreements with NASA Ames, Commercial Customers and the USAF Space Test Program
- Development of Spaceflight Secondary Payload System (SSPS) underway to standardize launch integration approach and provide additional flexibility for secondary payloads
- SHERPA tug will expand mission flexibility and enable new missions as well as hosted payloads
- Payload User's Guide (Rev D) recently released with additional mission integration information - available for download at www.spaceflightservices.com





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