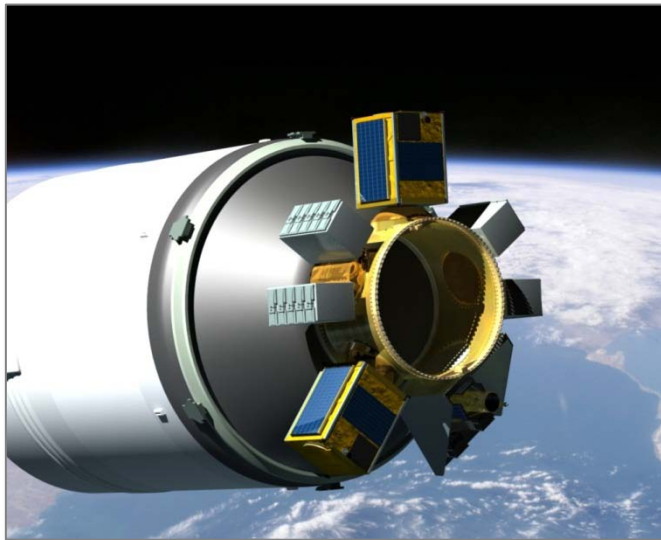




# Cal Poly CubeSat Workshop 2014

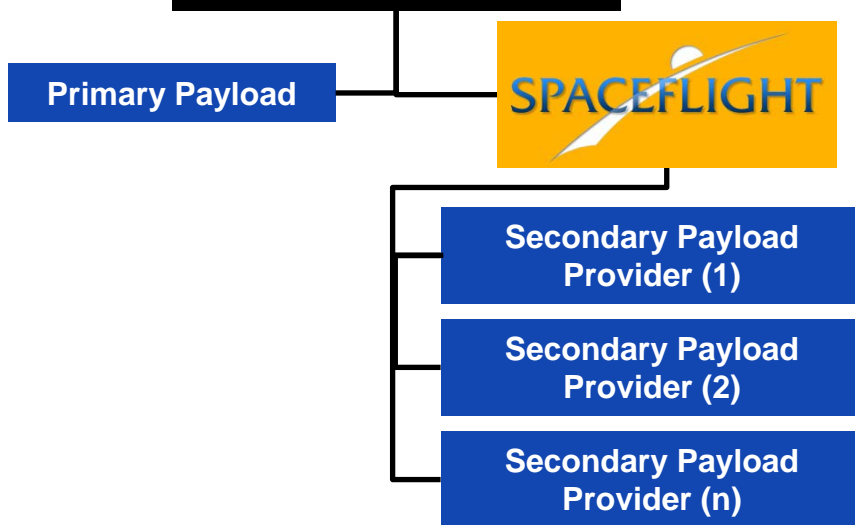


866.204.1707  
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 [@spaceflightinc](https://twitter.com/spaceflightinc)

## Our Model

Arrange launch opportunities for secondary payloads by contracting directly with the Launch Service Providers (LSP) and Secondary Payload Providers

### Rideshare Model



### Access to Launch Vehicles



## Benefits for Satellite Developers

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

## Benefits for Launch Service Providers

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



## Antares A-One 2013

Customer	Launch Provider	Size	Payload	Deployer	Launch Date
Planet Labs	Orbital Sciences	3U	Dove 1	ISIPOD	04/19/2013
NASA Ames	Orbital Sciences	1U (3x)	PhoneSats	ISIPOD	04/19/2013
<b>Total Launched:</b>		<b>4</b>			

Launched  
To Date:

36



## Soyuz April 2013

Customer	Launch Provider	Size	Payload	Deployer	Launch Date
Planet Labs	Roscosmos	3U	Dove 2	ISIPOD	04/19/2013
<b>Total Launched:</b>		<b>1</b>			



## Dnepr November 2013

Customer	Launch Provider	Size	Payload	Deployer	Launch Date
Planet Labs	Kosmostras	3U	Dove 3	ISIPOD	01/21/2013
<b>Total Launched</b>		<b>1</b>			



## Cygnus / ISS January 2014

Customer	Launch Provider	Size	Payload	Deployer	Launch Date
Planet Labs	NanoRacks/ISS	3U (28x)	Flock 1	NanoRacks	01/09/2014
University of Peru	NanoRacks/ISS	1U	UAP-SAT	NanoRacks	01/09/2014
Southern Stars	NanoRacks/ISS	1U	SkyCube	NanoRacks	01/09/2014
<b>Total Launched</b>		<b>30</b>			

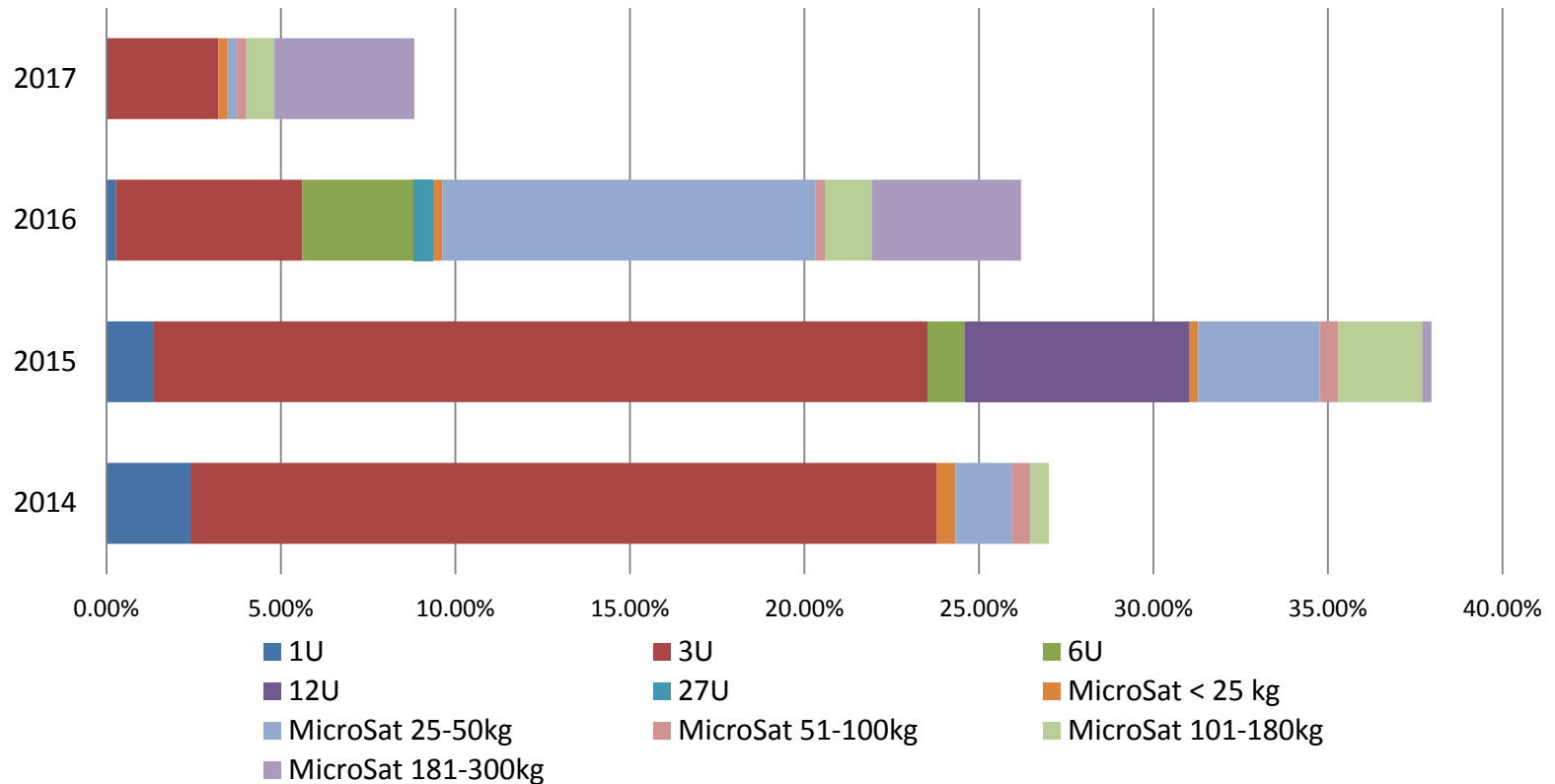
Spaceflight maintains a customer relationship management (CRM) launch demand database and has gained unique insights into small sat launch and orbit preferences

## Launch Demand Segmented by:

- **Mission Type ( civil, defense, commercial)**
- **Mission Profile (remote sensing, technology demonstration, communication ,etc.)**
- **Spacecraft form factor (1U, 3U, 6U, etc.)**
- **Customer Country of Origin**
- **Launch Year**
- **Altitude and Inclination Preference**
- **Spacecraft with/without propulsion**

Spaceflight is tracking missions for 350 spacecraft, which is roughly 11 mt

# of Spacecraft Launch Demand by Form Factor (2014-2017)

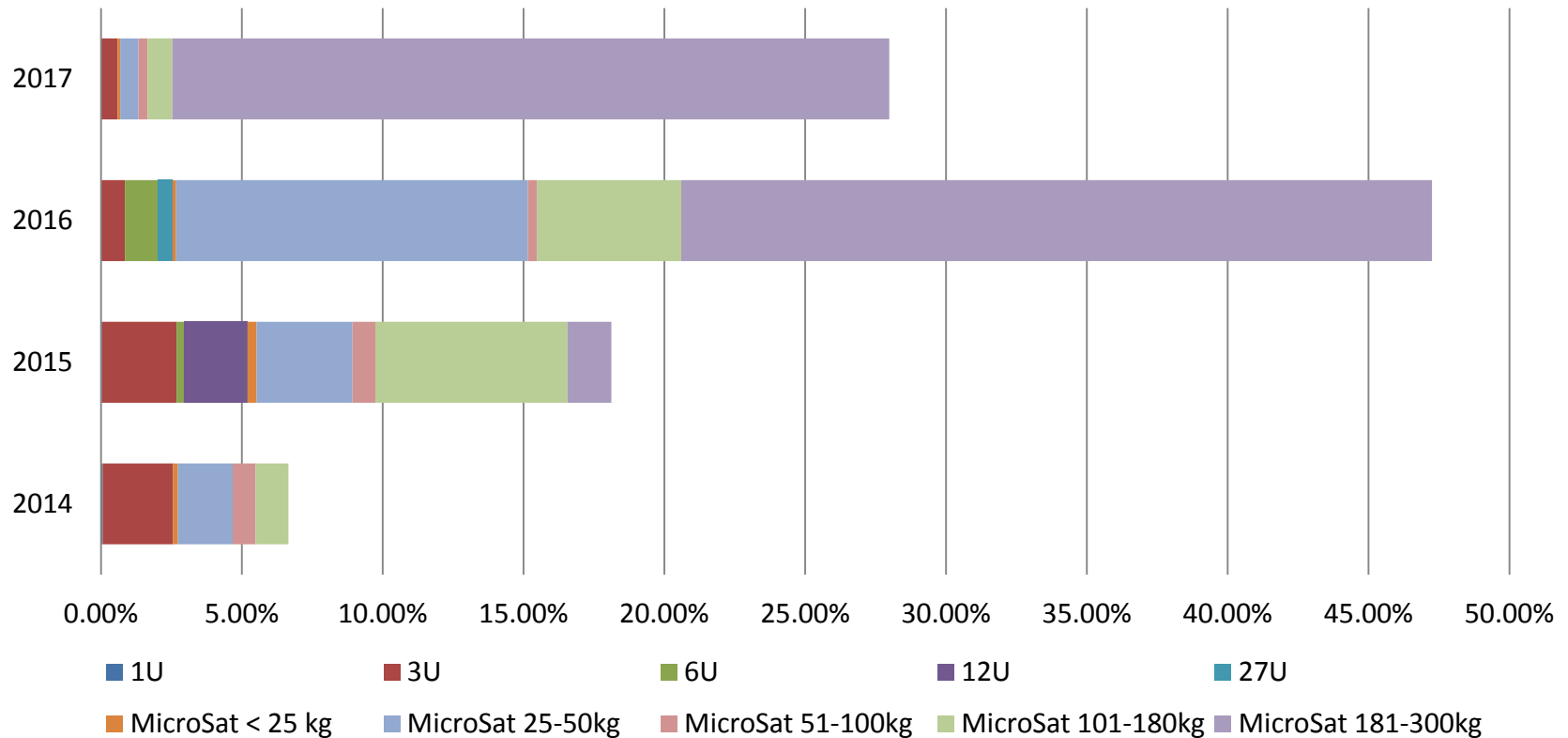


**CubeSat trend is toward larger 3U to gain greater performance**

\*Data Set is from Spaceflight's Proprietary Market Intelligence Database

Spaceflight is tracking missions for 350 spacecraft, which is roughly 11 mt

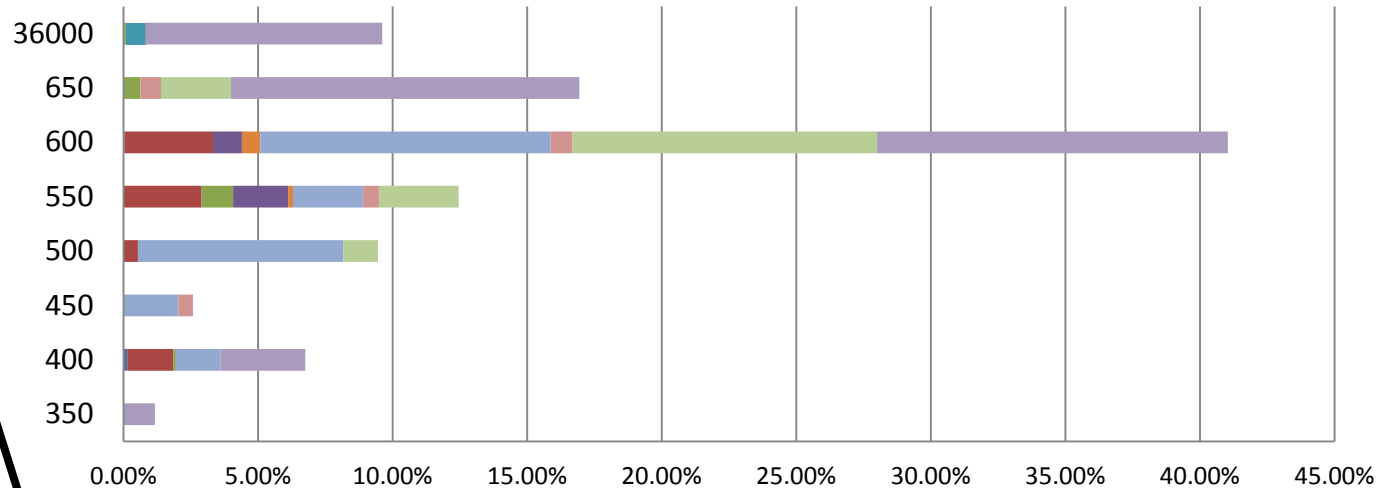
### Spacecraft by Form Factor To Be Launched 2014-2017



**As a percentage of total demand by mass, MicroSats dominate total spacecraft mass seeking launch**

\*Data Set is from Spaceflight's Proprietary Market Intelligence Database

## Spacecraft Mass by Form Factor, Altitude, and Mass



**Cubes low % of total smallsat rideshare**

	350	400	450	500	550	600	650	36000
1U	0.00%	0.14%	0.02%	0.01%	0.00%	0.04%	0.00%	0.00%
3U	0.00%	1.72%	0.00%	0.53%	2.90%	3.28%	0.00%	0.00%
6U	0.00%	0.09%	0.00%	0.00%	1.17%	0.00%	0.63%	0.09%
12U	0.00%	0.00%	0.00%	0.00%	2.05%	1.08%	0.00%	0.00%
27U	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.72%
MicroSat < 25 kg	0.00%	0.00%	0.00%	0.00%	0.18%	0.68%	0.00%	0.00%
MicroSat 25-50kg	0.00%	1.66%	2.02%	7.64%	2.61%	10.78%	0.00%	0.00%
MicroSat 51-100kg	0.00%	0.00%	0.54%	0.00%	0.58%	0.81%	0.76%	0.00%
MicroSat 101-180kg	0.00%	0.00%	0.00%	1.28%	2.97%	11.32%	2.61%	0.00%
MicroSat 181-300kg	1.17%	3.15%	0.00%	0.00%	0.00%	13.03%	12.94%	8.81%

**CubeSats Can Ride the Coat Tails on Commercial Launches**

**SHERPA is a hosted payload and in-space transportation solution that supports orbit raising and maneuvering of secondary payloads in low earth orbit, geosynchronous orbit placement, low lunar orbit insertion, and interplanetary capability.**

### Custom ESPA Ring

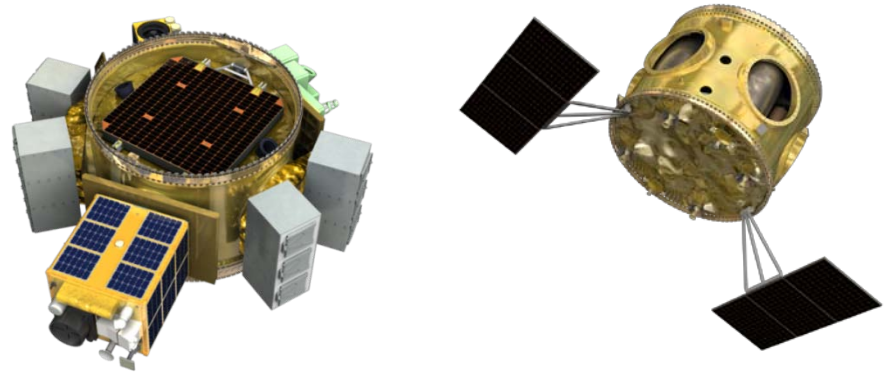
- Five 24 inch ports
- Supports up to five 300 kg – 120 x 100 x 140 payloads

### Avionics Deck

- Power, communication, pointing, and payload interfaces

### Propulsion Deck

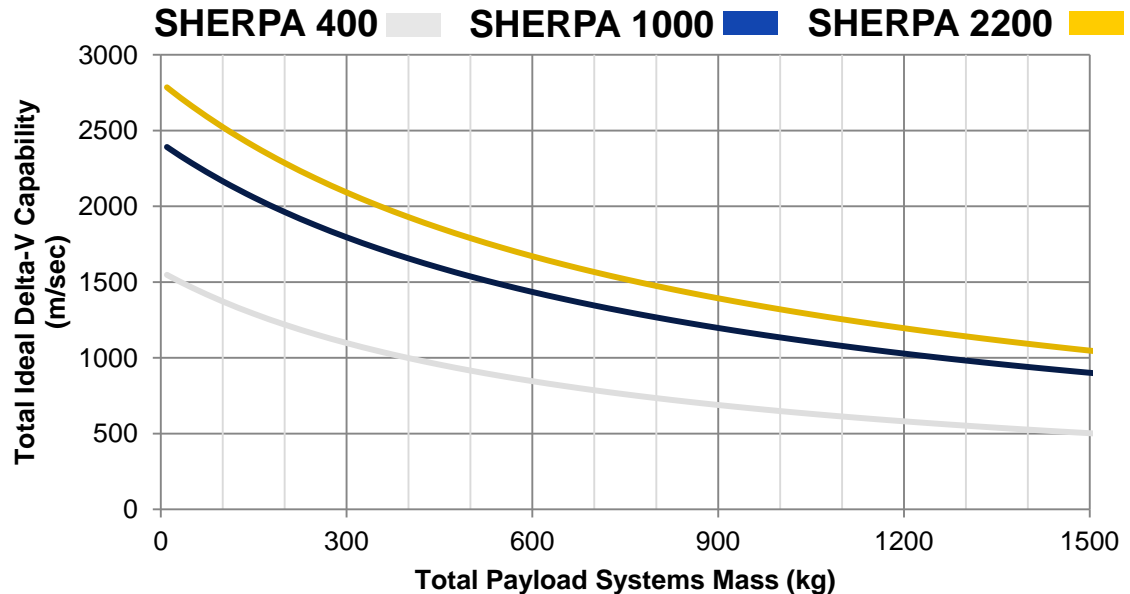
- Propellant and Pressurant tanks
- Primary thrusters



### SHERPA Performance

Vehicle	Propellant System
SHERPA 400	2 Tank Monopropellant
SHERPA 1000	4 Tank Monopropellant
SHERPA 2200	4 Tank Bipropellant

Mission Duration	3 Years Max
Power per Payload	50 W Orbit Avg Power
Payload Downlink	Up to 100 Mbps
Attitude Knowledge / Accuracy	< 15 arcsec / < 50 arcsec
RAM Capacity for Payload Data	4 GB

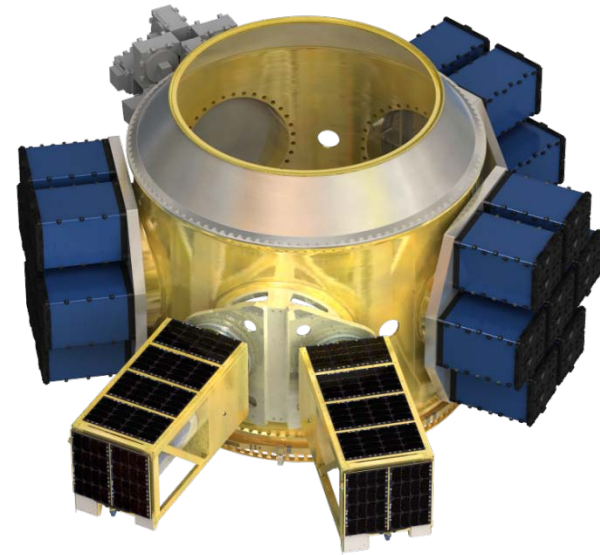






**Inaugural flight on a U.S. based Launch Vehicle**  
**Q3 2015 - 450 X 720km 98 Degrees 10:30 LTDN**  
**Up to 1000 kilograms of Secondary Payloads**  
**Customers range from CubeSats to 150kg microsats**

**Limited Capacity Available!**  
**Discounted Pricing Available**  
**Contact us after the presentation if interested**



Spaceflight is the **ONLY** rideshare provider to offer public commercial pricing

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

Commercial pricing based on payload size and mass

Launches for payloads ranging from CubeSats to MicroSats

Mission pricing for Low Earth Orbit to Low Lunar Orbit

\*\*\* Discounts available for launching multiple spacecraft

## Non Standard Options:

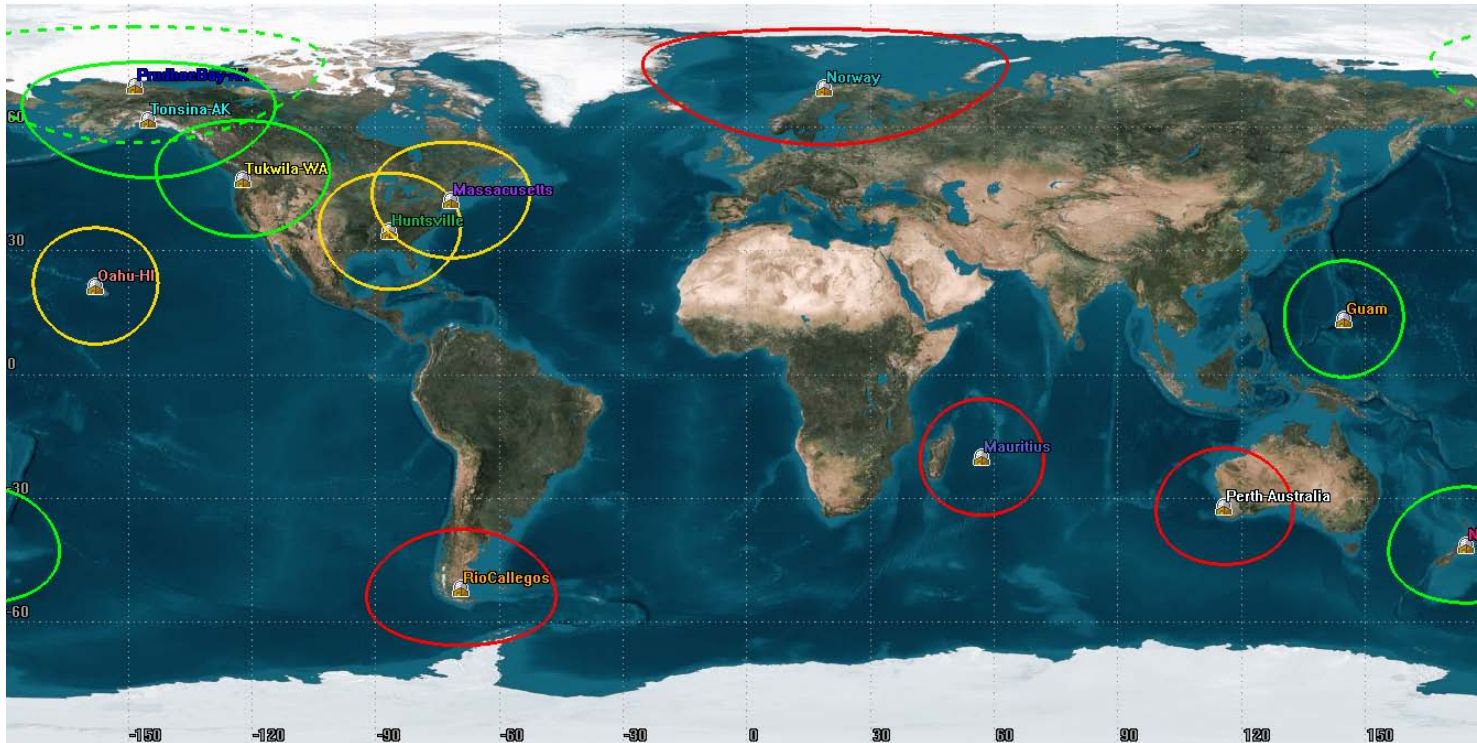
Constellation Deployment

Privacy Shroud for Security/Confidential Payloads

SHERPA Orbit Maneuvering:

- Altitude and Inclination
- In Space Transportation to the Moon, Mars, and Beyond

Spaceflight Networks will own and operate a global network of 11 of ground stations to provide communications connectivity through our dedicated networks operations center



**Phase 1 (green) – 2015: Alaska, Washington state, southern New Zealand, Guam**

**Phase 2 (yellow) – 2016: Hawaii, Huntsville, Massachusetts**

**Phase 3 (red) – 2017: Southern Argentina, Mauritius, Perth, Norway**

## Spaceflight Networks Service Packages and Pricing

### Antennas

- Parabolic dish with radome (X & S)
- Yagi antennas (UHF)

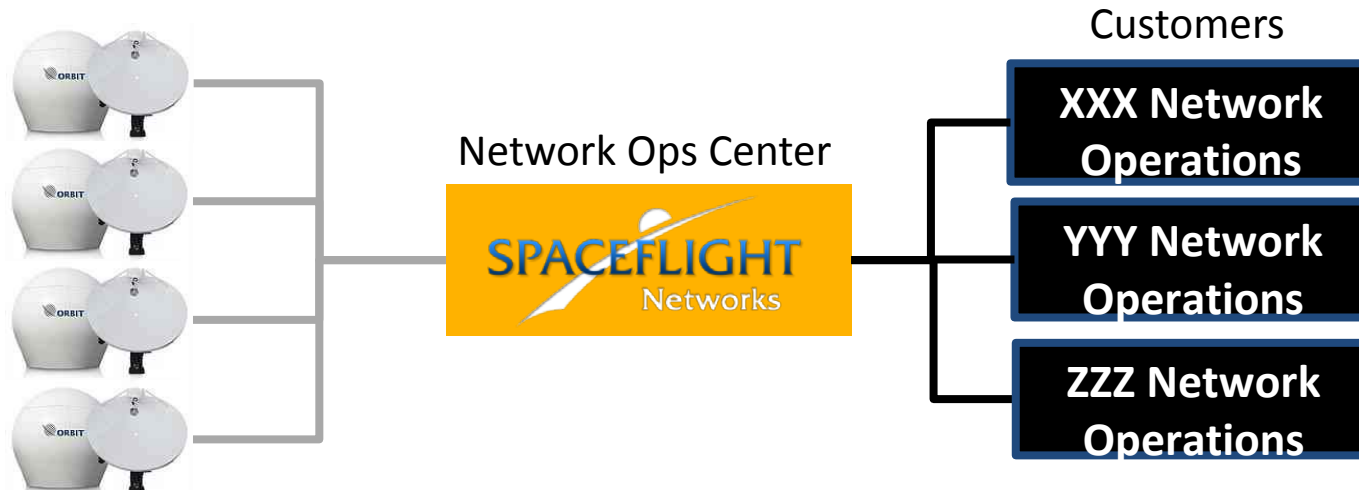
### Dedicated antenna lease – S/ X Band and UHF

- 24/7 use of a single antenna
- Monthly payment

### On Demand Access - S/ X Band and UHF:

- Use of an antenna on an “as needed” basis to support your spacecraft mission
- Pay by the minute

\*\*\*\*Firm pricing will be available June 1<sup>st</sup>, 2014





## Spaceflight offers full-service space access solutions for small satellites!

### **We find you the optimal launch**

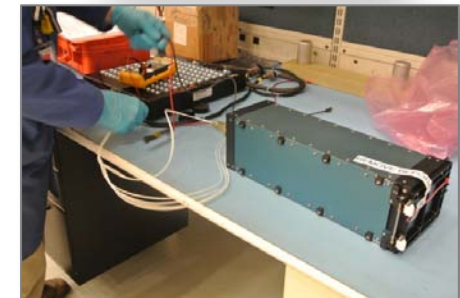
Access to nearly all launch service providers across the globe provides many launch options on a number of launch vehicles.

Secondary payload aggregation is key to finding the right orbit and at the right price



### **We support your launch campaign**

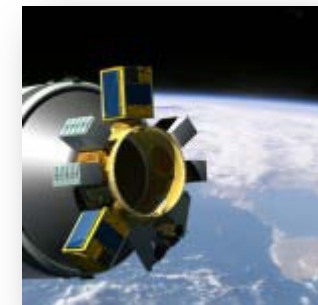
Our staff of experienced engineers and legal counsel is at your disposal to ensure your satellite has a seamless launch campaign - from providing design guidance and testing support to navigating regulatory compliance and ITAR.



### **We integrate your satellite to the launch vehicle**

Spaceflight is launch vehicle and deployment hardware agnostic. We use the best deployment mechanisms that meet your mission requirements.

Spaceflight physically mates your satellite to the launch vehicle and conducts tests to ensure safe and successful deployment on orbit.





**Adam Hadaller**  
**Mission Manager**

[www.spaceflightservices.com](http://www.spaceflightservices.com)

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