

Commercial Space Transportation: Challenges and Opportunities

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50 Years of Human Spaceflight



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Space Shuttle Retirement



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Commercial Cargo



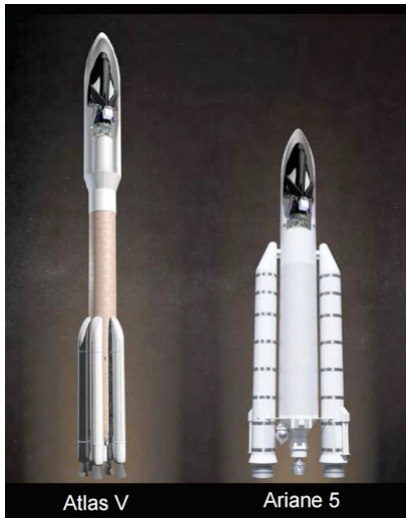
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Commercial Cargo – A New Provider



Atlas V

Ariane 5

Sierra Nevada Corporation
Dream Chaser



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Autonomous Spaceport Drone Ship



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Autonomous Spaceport Drone Ship



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Commercial Crew Program



SpaceX Dragon

Boeing CST-100



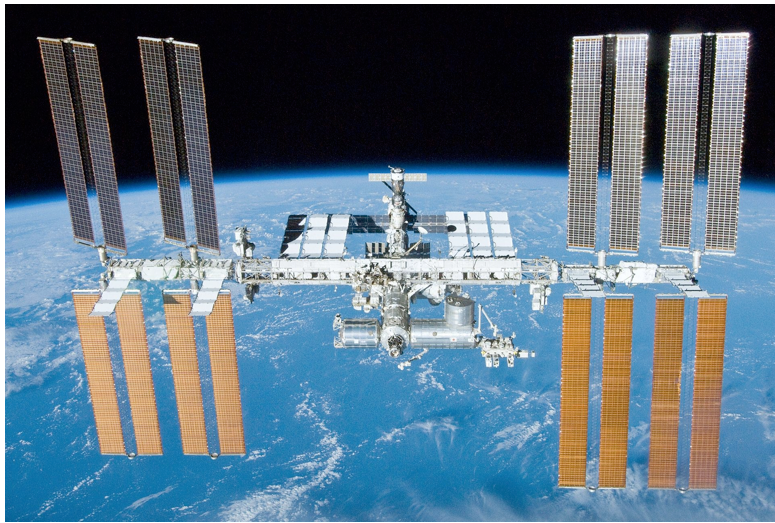
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Target Date - 2017



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Suborbital Space Tourism



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SpaceShipTwo Rollout



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Blue Origin



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Stratolaunch



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DARPA's XS-1

Program Goals:

- Fly 10 times in 10 days
- Exceed Mach 10
- Launch a small satellite into orbit
- Cost < \$5M per flight



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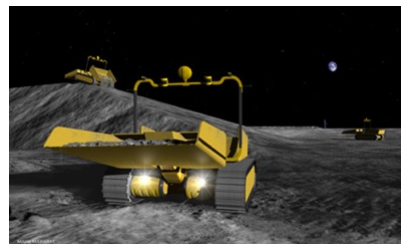
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Challenges and Opportunities

- How can we encourage and support new, non-traditional commercial operations in space?
- What should we do, if anything, in response to the proliferation of CubeSats and the increase in Orbital Debris?
- What is the best way to provide Space Traffic Management services?



Nontraditional Commercial Space Operations



Outer Space Treaty

Article VI

“The activities of non-governmental entities in outer space ... shall require authorization and continuing supervision by the appropriate State Party to the Treaty.”



Existing Regulatory Framework

- FAA – Responsible for licensing commercial launches and reentries
- FCC – Responsible for licensing radio broadcasts from space
- NOAA – Responsible for licensing remote sensing operations (such as taking pictures of the Earth)
- DoD and NASA are key players in space, but they are not regulatory agencies



Congressional Action



CSLCA Report

- As part of the Commercial Space Launch Competitiveness Act, Congress directed that OSTP assess current and proposed commercial activities in space, identify appropriate authorization and supervision authorities, and recommend an authorization approach.
- That has now been accomplished, with a report submitted to Congress by Dr. Holdren on April 4, 2016.

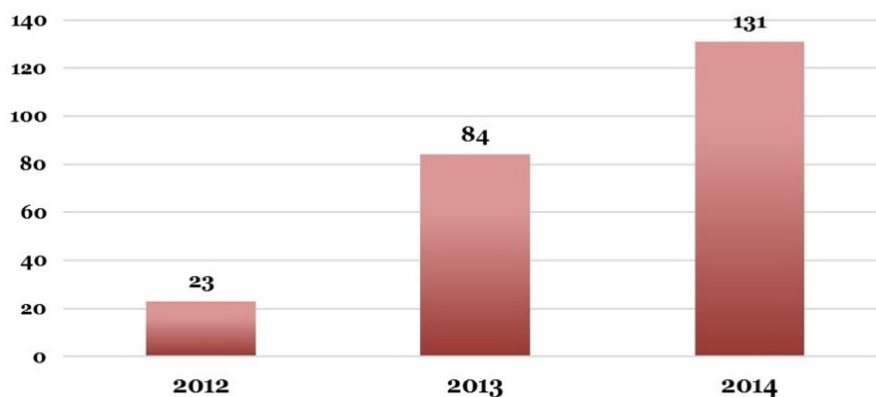


Recommended Approach

- The Secretary of Transportation would be authorized to grant authorizations for missions in outer space, consistent with the international obligations, foreign policy, and national security interests of the United States, and U.S. Government uses of outer space.
- Process would be modeled on FAA Payload Review process.
- Would not impact Government activities or missions already licensed by FCC or NOAA.



CubeSats Launched Per Year

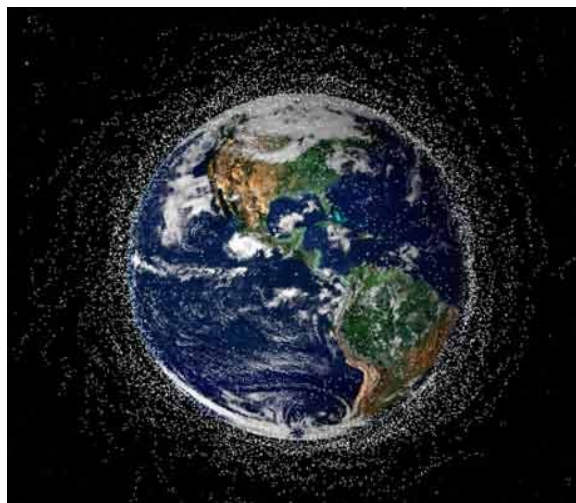


The Problem with CubeSats

- More of them are being launched every year
- As spacecraft get smaller, they are becoming more difficult to track
- Currently, there are no limits on satellite altitude or inclination, so popular orbits will likely become more and more congested
- Commercially operated satellites are not obligated to follow international guidelines for orbital lifetime and/or disposal
- Because they typically have short operational lifetimes and/or limited reliability, many CubeSats quickly turn into Orbital Debris



Orbital Debris



The Movie “Gravity”



Collisions in Space



Space Traffic Management

Definition:

The set of technical and regulatory provisions and processes used to oversee, coordinate, regulate, and promote safe and responsible space activities, including access to space, operations in space, and return from space to Earth to avoid physical and/or electromagnetic interference (EMI).



Key STM Stakeholders

- Department of Transportation (DOT)
 - Federal Aviation Administration (FAA)
- Department of Defense (DOD)
- Department of Commerce (DOC)
 - National Oceanic and Atmospheric Administration (NOAA)
 - National Telecommunication and Information Agency (NTIA)
- Department of State (DOS)
- National Aeronautics and Space Administration (NASA)
- Office of the Director of National Intelligence (ODNI)
- Federal Communications Commission (FCC)



A Potential Way Forward

- Allow the FAA to process and release safety-related space situational awareness data, consistent with the national security interests and public safety obligations of the United States.
- Begin transitioning commercial collision avoidance assessments from DoD to the FAA.
- Designate the Department of Transportation as the lead federal agency for providing Space Traffic Management services to commercial space operators.



STRATCOM Perspective

From BreakingDefense.com
June 16, 2015

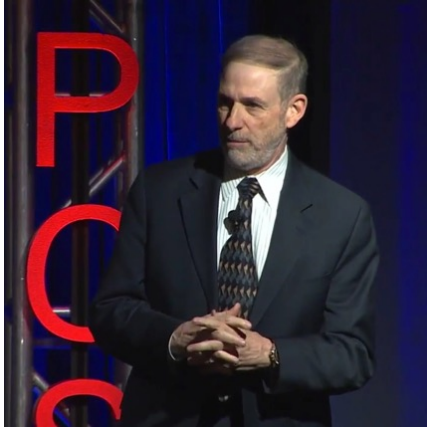
AIR SPACE

STRATCOM Must Be Warfighters, Not FAA In Space: Lt. Gen. Kowalski

By SYDNEY J. FREEDBERG JR.
on June 16, 2015 at 1:54 PM



The View from the Pentagon



“The FAA really should be in charge of managing what’s going on in space.”

-Douglas Loverro, Deputy Assistant Secretary of Defense for Space Policy, at the International Symposium for Personal and Commercial Spaceflight, October 15, 2014

Closing Thoughts

- Commercial space companies increasingly have the potential to carry out activities that used to be only in the government’s domain, and at least in some cases, to do so even without government support.
- However, there are a number of things the government can do in the near term to decrease barriers to innovation, streamline burdensome policies, eliminate regulatory uncertainty, and increase on-orbit safety.
- The FAA’s Office of Commercial Space Transportation is committed to working with other nations, other government agencies, and the U.S. Congress to enable industry’s success, while preserving the space environment.



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