



Launch Vehicles Technical Committee Report - 22nd Annual Small Payload Rideshare Symposium

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September 2022

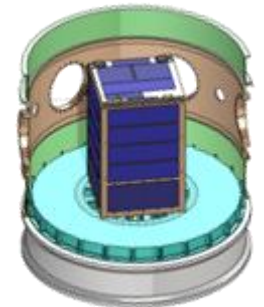
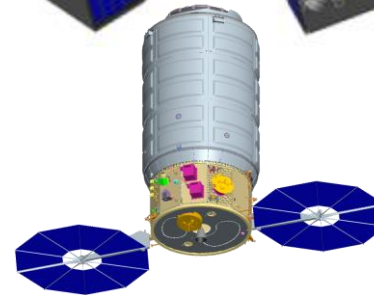
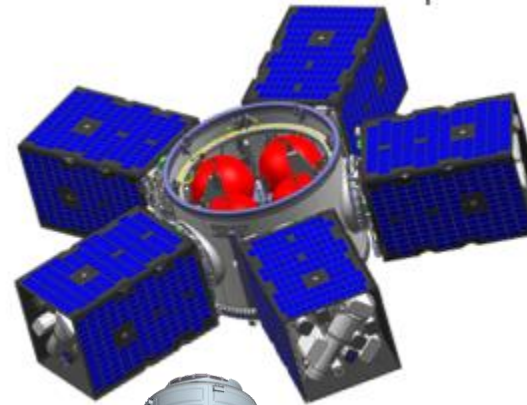
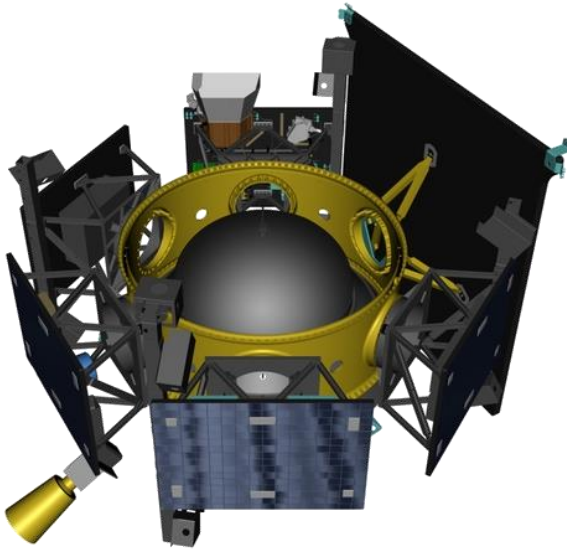
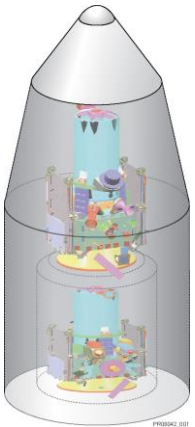
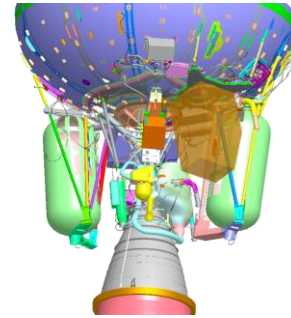
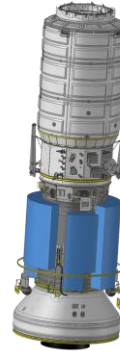
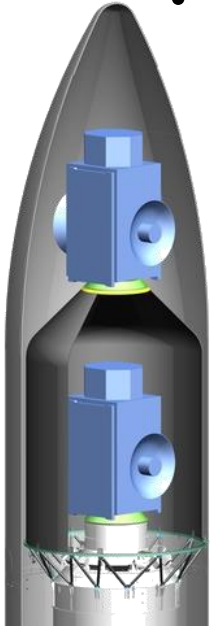


Launch Vehicle Technical Committee Description

- This committee will review the status of the current and pending launch vehicles across the world. The focus should include both the supply side issues as well as the demand side issues. The types of and compatibility with secondary adapters or payload interfaces should be evaluated; the potential availability of secondary opportunities should be discussed; and the issues of access to secondary capability, scheduling, and manifesting should be identified. Issues, concerns, suggestions, and options should be noted, discussed, and summarized based on the collective views of the committee membership.

Secondary Payload Accommodations

- Numerous – Too Many to List



Launch Vehicle Interfaces

- CubeSat (1U, 3U, 6U, 12U, 16U, 24U, 27U, 36U)
 - Rail or Tab-type
- Dedicated Sep Systems
 - 8" / 12 fasteners (ESPA)
 - 15" / 24 fasteners (ESPA)
 - 23.25" / 32 fasteners
 - 24" / 36 fasteners (ESPA Grande)
 - 37.15" / 60 fasteners
 - 38.81" / 60 fasteners
 - 62" / 120 or 121 fasteners
- Sep Nut
- Pad (ESPA)
- Proprietary (Starlink, OneWeb, Kuiper, etc)



RideShare Proliferation

- Consolidated from data from Jonathan’s Space Report, which Lists Every Satellite Ever Launched, and which Rocket it Launched on, Where from, from the Very First Launch (Sputnik) to 25 May 2022 (updated ~bimonthly)
- From 1957 until 25 May, 2022, JSR Lists 16,138 satellites launched.
In the last 8 years (June to June):

Year	# of Missions (Failures)	# of Satellites Launched	# Satellites/ Launch (rounded to integer)	Number of Multi-Manifest Launches (%)
2022 - 21	145(10)	1773	12	57 (39)
2021 -20	116 (8)	2047	17	66 (57)
2020-19	105 (5)	738	7	59 (56)
2019-18	102 (6)	618	6	49 (48)
2018-17	109 (3)	460	4	54 (49)
2017-16	83 (4)	336	4	31 (37)
2016-15	92 (2)	275	3	32 (35)
2015-14	87 (2)	286	3	33 (38)

US Small Launch Vehicles

Images Courtesy of
 Phil Smith,
 Bryce, Firefly,
 Rocket Lab,
 Relativity, Astra,
 Virgin Orbit
 NOT TO SCALE

- Currently on OSP-4 – (USSF)
 - **Northrop Grumman**
 - **Virgin Orbit**
 - **Rocket Lab**
 - **Astra**
 - Firefly
 - Aevum
 - X-Bow
 - Relativity
 - ABL

- Currently on NLS-II
 - Northrop Grumman

- Currently on VCLS - (NASA)
 - **Rocket Lab**
 - **VOX**

- Currently on VADR – (NASA)
 - **Northrop Grumman**
 - **Virgin Orbit**
 - **Rocket Lab**
 - **Astra**
 - Phantom Space
 - Relativity
 - ABL
 - Firefly
 - **SpaceFlight**
 - **L2 Solutions**

Legend: **Have Achieved Orbit Brokers**

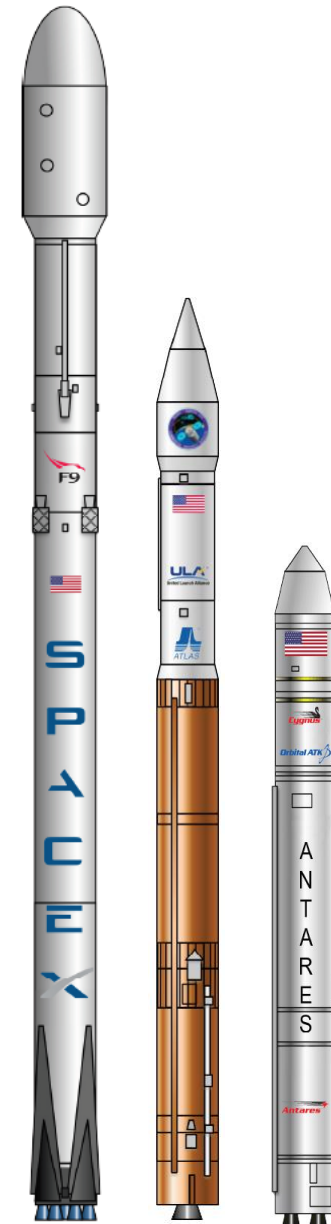


Current Medium/Large US Launch Vehicles

- Medium/Intermediate/Heavy (Multiple Definitions)
- National Security Space Launch (NSSL) and NASA Launch Service (NLS) Vehicles
- 3 Flying (*June 21 – June 22 launches*)
 - Antares (2 – Neither multi-satellite)
 - Atlas V (6 – 3 multi-satellite)
 - Falcon (37 – 26 multi satellite)

(Number of Satellites on Multi Manifest Missions)

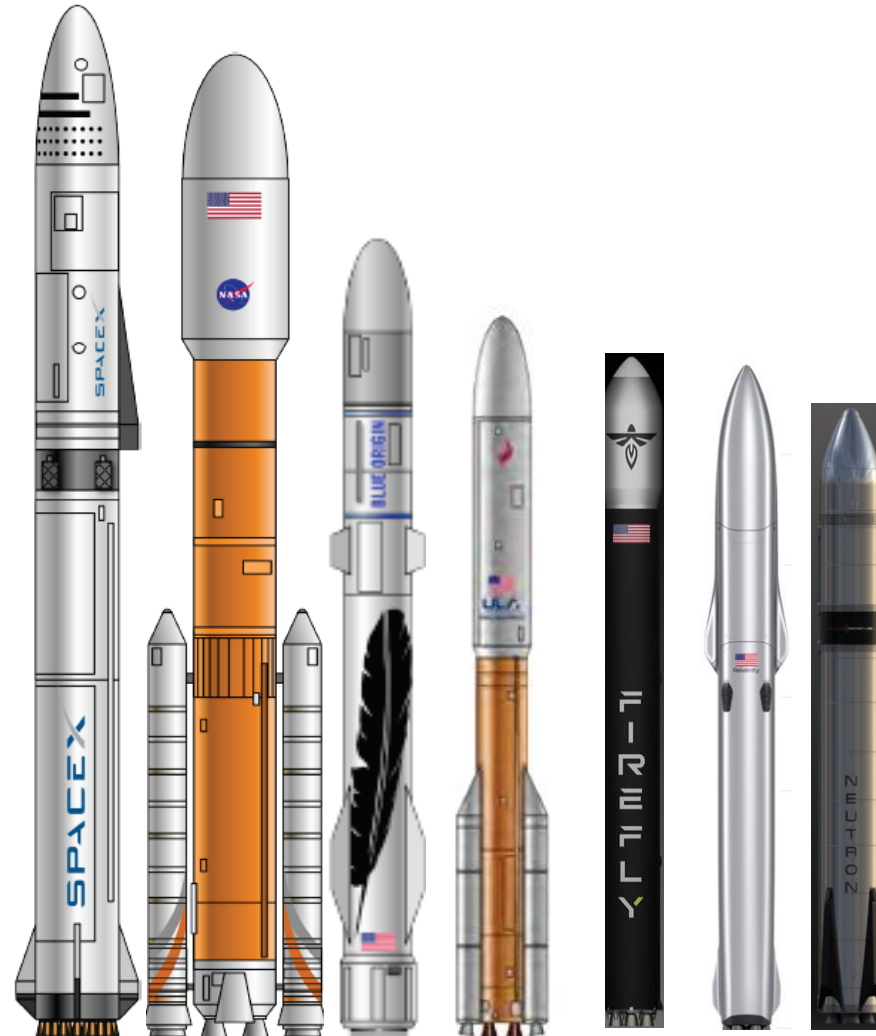
* Single Customer Multi-Manifest Missions



Images Courtesy of Phil Smith, Bryce, ULA NOT TO SCALE

US Medium/Large Launch Vehicles

- 7 Incoming
 - MLV
 - New Glenn
 - Neutron
 - Terran-R
 - Starship
 - SLS
 - Vulcan
- None have Achieved Orbit yet – Some expected VERY shortly!



Images Courtesy of Phil Smith, Bryce, Firefly, Rocket Lab, Relativity
NOT TO SCALE

RideShare Operational Success

- ESPA Inclusion on USG Missions is Progressing
 - Planned for Many USSF and NASA Missions, including organizational cross-over missions
- RSLP Rideshare Users Guide (2019) has been Released, Formalizing Secondary's on EELV's:
 - Secondary's are “Auxiliary Payloads” (APL's)
 - CubeSat Accommodations (3 and 6U sizes)
 - Aft Bulkhead Carrier
 - ESPA, ESPA Grande
 - A-Deck
- NASA SMD RUG (2021) released
 - Secondary's are “Rideshare Payloads” (RPL's)
 - ESPA, ESPA Grande
 - Includes Do No Harm
- SLPRD and SLIS Released (2019), Formalizing small satellite interfaces and program requirements (USSF)
- SPARTN Released as Tutorial (NRO)
- MMDS In Work As Open Source Multi-Manifest Reference

RideShare Operational Success

- Launch/Ride Brokers Commercially Successful and Proliferating
 - SpaceFlight Inc
 - ISIS
 - SpaceX
 - TriSept
 - Tyvak
 - Exolaunch (EXOpod)
 - DeOrbit
 - Momentus
 - Precious Payloads
- Government Organizations Active
 - USSF Multi Manifest Office
 - NASA Shared Ride Office
 - NASA CubeSat Office
 - NRO Office of Space Launch



Small Payload Ride Share Association