



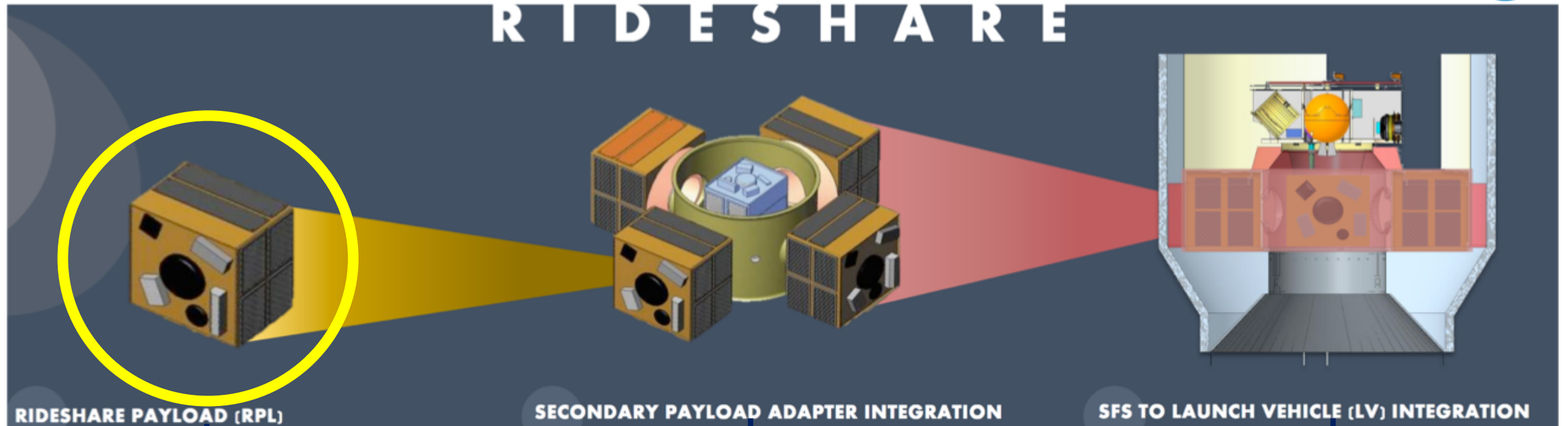
2018 Heliophysics STP Mission of Opportunity Kickoff

IMAP Secondary Payload Adapter Accommodations

Alan Zide/Alicia Mendoza-Hill
NASA Science Mission Directorate
Heliophysics Division Program Executive
September 5, 2019



Rideshare



RIDESHARE PAYLOAD (RPL)

SECONDARY PAYLOAD ADAPTER INTEGRATION

SFS TO LAUNCH VEHICLE (LV) INTEGRATION

RPL Development/Build/Test
Performed by RPL proposal team

SPA Integration Services (SPA-IS)
Performed by Launch Vehicle Contractor

SPA Flight System(SFS)
Performed by Launch Vehicle Contractor



Rideshare Payload (RPL)

Description/Roles & Responsibilities

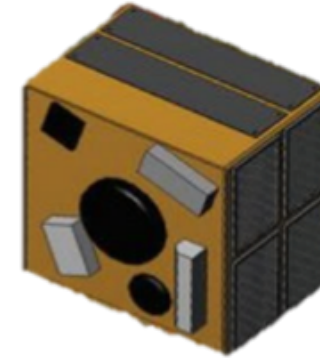
Rideshare Payload (RPL): A payload that is manifested subordinate to a primary payload, and, therefore, is subordinate in launch date and orbit selection. AKA Secondary payload/Auxiliary payload

RPL Project R&R:

- Build RPL
- Develop RPL analysis models (thermal, CAD, Finite Element, etc)
- Ensure no impact to the Primary mission's integration schedule
- Comply with Secondary Payload Adapter (SPA) interface requirements (as established in "SIS" document)
- Deliver RPL to the SPA-IS Contractor
- Support all phases of integration (payload onto SPA, and SPA onto Launch Vehicle)
- Provide lifting fixtures to support mate operations onto the SPA
- RPL Mission Assurance and Do No Harm:
 - Comply with Rideshare Mission Assurance process in SPA System Interface Specification document
 - Comply with established Do No Harm Criteria with respect to Launch Vehicle

STP Program Management (NASA)

- Manage RPL Project to ensure no impact to the Primary mission
 - Verify compliance with Secondary Payload Adapter (SPA) interface requirements (as established in "SIS" document)
 - Verify RPL Mission Assurance and Do No Harm



Funding Source

- RPL Project
 - RPL complete engineering life cycle
 - RPL testing, ICDs, analysis, and modeling support with the SPA-IS Contractor
 - Mission Unique requirements costs
 - Delivery to SPA-IS Contractor location
 - RPL-specific lifting attachments/fixtures
 - Support throughout launch campaign



Secondary Payload Adapter - Integration Services (SPA-IS)

Description/Roles & Responsibilities

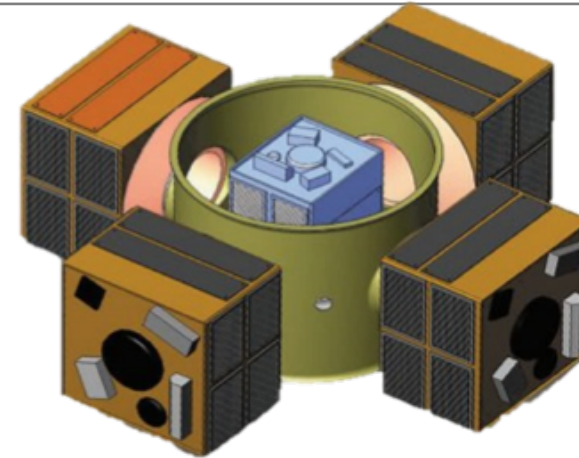
SPA Integration Services (SPA-IS) Provider: Launch Service Contractor organization responsible for the system engineering life cycle for the SPA Flight System (SFS) by bringing together the Secondary Payloads, the SPA and Ancillary Hardware.

SPA-IS Provider R&R:

- Procure SPA ring and ancillary hardware, including separation systems
- Manage and perform physical integration of the RPLs to the SPA
- Provide mass simulator; provide integration facilities and ground support equipment for AI&T of the SPA Flight System (SFS)
- Interface with NASA Program Manager and NASA LSP (ICD's, Environmental test support, launch site requirements, etc.)
- Develop SPA Flight System integrated analysis models for delivery to NASA LSP (thermal, CAD, Finite Element for coupled loads, etc.)
- Deliver SFS to the Launch Service Contractor location
- Coordinate all Launch Vehicle (LV) related activity and access with NASA LSP
- Support contingency planning and operations at the launch site
- RPL and SFS Mission Assurance and Do No Harm (DNH):
 - Verify that the RPLs, and other flight hardware are DNH compliant and pose no risk to NASA Primary mission
 - Verify RPL compliance with SPA interface requirements and established DNH Criteria with respect to LV
 - Work with LSP to develop, manage, and verify DNH criteria with respect to LV
 - Develop and submit Range Safety documentation for each of the RPLs and the SFS

NASA Launch Services Program R&R:

- Direct Management/Procurement of SPA-IS contract



Funding Source

- Primary Mission's Sponsoring Division:
 - Fund Secondary Payload Integration costs
 - Included as part of LSP Primary Mission Launch Service contract
 - Secondary Payload integration Hardware (SPA ring, separation systems, etc.)
 - Payload separation sequencer procured by SPA-IS vs LSP LV contractor
 - Mass Simulator



SPA Flight System (SFS) to Launch Vehicle Integration

Description/Roles & Responsibilities

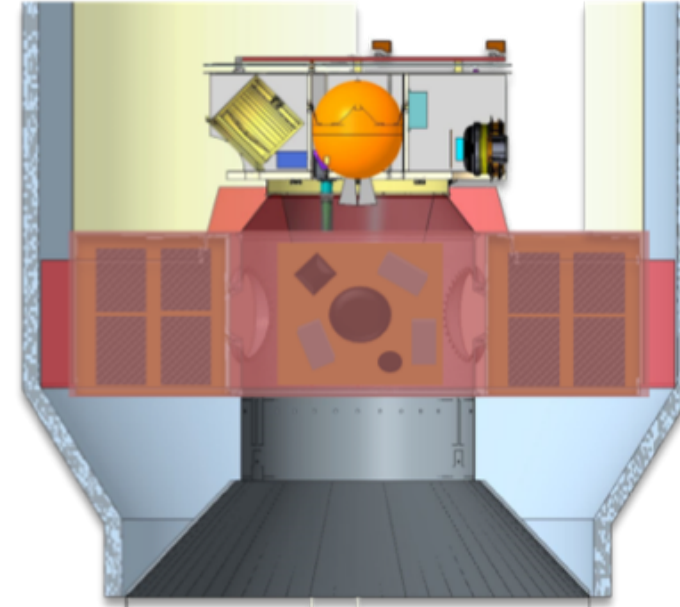
The integration of the SPA Flight System to the Launch Vehicle (LV).

SPA Flight System (SFS) to LV Integration R&R:

- Integration service procured as part of the Primary Mission Launch Service Task Order (LSTO) by the Launch Services Program (LSP)
 - SFS integration
 - Mission Uniques for RPLs
- Additional NLS-II services (i.e. telemetry for RPLs)
- Ensure no impact to the Primary mission's LV integration schedule
- Responsible for interfacing with SPA-IS Provider and the LV Contractor for (ICD's, Do No Harm, Environmental test support, etc)
- Checkout or IV&V of SPA Flight System integrated analysis models for delivery to LSC (thermal, CAD, Finite Element coupled loads, etc)
- Interface with SPA-IS Program Manager for NLS-II contract
- LV Mission Assurance and Do No Harm (DNH):
 - Work with RPLs and SPA-IS to develop DNH criteria with respect to LV
 - Verify RPL compliance with established DNH Criteria with respect to LV
 - Verify SFS compliance with established DNH Criteria with respect to LV and Primary mission requirements
 - Chair Payload Safety Working Group reviews/meetings for the SFS, and individual RPLs if required (NPR 8715.7)

NASA Launch Services Program R&R:

- Manage the integration of the SPA Flight System (SFS) to LV
- Verify compliance to DNH Criteria

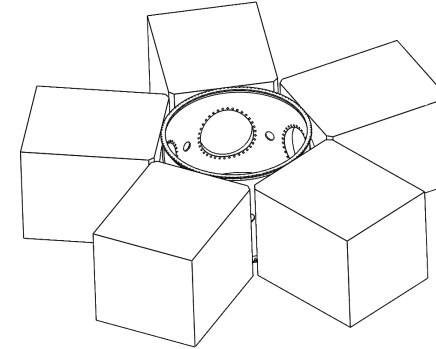
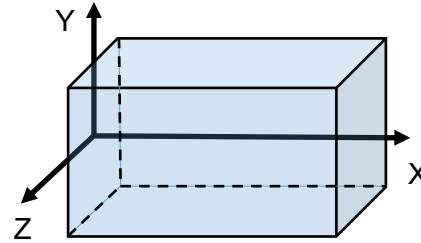
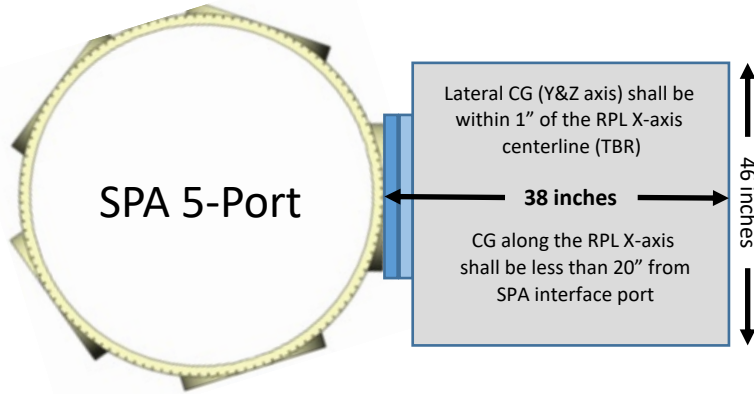


Funding Source

- Primary Mission's Sponsoring Division:
 - Fund NASA LSP Primary Payload NLS-II Launch Service contract
 - Fund NASA LSP Mission Unique SFS integration contract
 - Full cost vs. Negotiated split between sponsoring primary payload division & other secondary payload divisions



Secondary Payload Adapter (SPA) Interface



Max RPL Mass	Allowable RPL Volume	RPL Interface
320 kg ⁽⁵⁾	42"x46"x38" (1, 2, 3, 4) Y, Z, X	24" circular

- (1) This assumes a 4-meter fairing.
- (2) The Atlas V 4-meter fairing has additional fairing sweep stay-out zones at the base of the fairing that may be applicable to the IMAP mission. These are defined in the LV users guide see link below: <https://www.ulalaunch.com/docs/default-source/rockets/atlasusersguide2010.pdf>
- (3) The RPL X-axes starts at the SPA port interface plane.
- (4) The RPL X-axes dimension includes the separation system width. This means separation system width will be subtracted from the 38" allowable dimension.
- (5) The flyaway portion of the separation system shall be considered as part of the RPL total mass.



Key Documents

Secondary Payload Adapter System Interface Specification (SIS)

- The SIS will be your main system requirements specification for Phase A
- Meeting nominal timeline inputs to support IMAP Mission Integration Cycle in Appendix A is critical. Decisions are defined when RPL will be replaced by mass simulator if behind schedule

Launch System Interface Requirements Document (LSIRD)

- The LSIRD is a tool used to capture your early interface requirements in support of developing the Launch Services Task Order (LSTO)
- Mission Unique requirements definition is critical to properly size the secondary payload adapter approach. This can have a significant impact during the LSTO competition



RPL Do No Harm

- Rideshare Payload
 - Design should be done to aerospace standards including appropriate safety factors for tested and untested hardware
 - Design must physically comply with the space allotted and remain constrained and sufficiently stiff to not make contact with launch vehicle or other spacecraft hardware during flight
 - Dynamic modes of the auxiliary payload must be sufficiently understood and communicated to ensure no detrimental dynamic loading onto the launch vehicle or primary spacecraft
 - RPL must maintain integrity and not separate prematurely under worst case predicted loads and environments (acoustic, shock, vibe, thermal, depressurization)
 - The IMAP spacecraft is highly sensitive (ISO Level 7 (Class 10,000) contamination control) to both molecular and particulate contamination. Design surfaces within the fairing volume shall meet the IMAP requirements unless proven through contamination transport analysis to not pose a contamination threat to the IMAP observatory



Summary

- A well defined process is in place to ensure the highest practicable probability of mission success
- We will work closely with your team to answer any questions

Questions related to the Secondary Payload Adapter accommodations must be submitted to:

Alicia Mendoza-Hill
Program Executive
NASA Heliophysics Headquarters
Phone: 202-358-1139
Email: alicia.mendoza-hill@nasa.gov

Alan Zide
Program Executive
NASA Heliophysics Headquarters
Phone: 202-358-2154
Email: alan.j.zide@nasa.gov

Questions related to the Launch Service Program must be submitted to:

Garrett Skrobot
Mission Manager
NASA Launch Services Program Code VA-C
Kennedy Space Center, FL 32899
Phone: 321-867-5365
Email: garrett.l.skrobot@nasa.gov