

SCIENCE MISSION DIRECTORATE POLICY

**Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adapter (ESPA)
Secondary Payloads Rideshare**

SMD Policy Document SPD-32

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Responsible SMD Official: Deputy Associate Administrator for Programs (DAAP)

VERSION HISTORY

Original SPD-32

DISTRIBUTION STATEMENT: Approved for public release.

I. BACKGROUND

This policy establishes the Science Mission Directorate (SMD) framework for utilizing the excess capacity, to include excess ascent performance and other mission resources, on SMD missions by supporting the integration of secondary payloads onto Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adapter (ESPA) rings. In this document, the term “ESPA-ring” will be used to represent all variants of the Evolved Expendable Launch Vehicle Secondary Payload Adapter ring, including the standard ESPA, the ESPA Grande, and propulsive ESPA. This policy enables increased opportunities for launch accommodations for ESPA-class payloads that address various science, technology, and exploration goals. Additionally, the process for identifying, prioritizing and selecting secondary payloads in accordance with this policy, is captured in Appendix C of this document.

II. POLICY

- a. It is SMD policy to enable rideshare or launch accommodation opportunities using an ESPA ring as part of the launch service procured for an SMD primary payload.
- b. SMD will determine the potential for excess capacity, as identified by Launch Services Program (LSP), after selection of the primary payload (once launch requirements are known). If excess capacity is identified, SMD will utilize the identified excess capacity on SMD primary payload missions using an ESPA ring, for the launch of SMD-sponsored secondary payloads, either competed or directed, that meet science, technology, and exploration goals.
- c. SMD may solicit science, technology, and exploration investigations as secondary payloads from the private sector, including commercial and non-profit entities and educational institutions through broad agency announcements.
- d. SMD may offer any excess capacity not utilized for SMD investigations to other NASA Mission Directorates (MD), other U.S. Government Agencies, or NASA’s International partners in accordance with international agreements for international collaborative efforts relating to science, technology, and exploration goals.

III. APPLICABILITY

- a) This policy is applicable to the Science Mission Directorate.
- b) This policy applies to:
 - a) all orbital commercial launch services procured for SMD-sponsored primary payloads;
 - b) orbital commercial launch services procured for other Government Agencies;

- i. for which NASA SMD is responsible and
 - ii. the other Government Agency lacks secondary payload candidates to utilize all excess capacity.
- c) This policy is not applicable to launches of non-SMD primary missions, sub-orbital launches, or payloads launched on the Space Launch System (SLS).
- d) In this policy document, all mandatory actions (*i.e.*, requirements) are denoted by statements containing the term "shall." The terms "may" or "can" denote discretionary privilege or permission; "should" denotes a good practice and is recommended, but not required; "will" denotes expected outcome; and "are/is" denotes descriptive material.
- e) In this policy document, all document citations are assumed to be the latest version unless otherwise noted.

IV. AUTHORITY

- a. National Aeronautics and Space Act, 51 U.S.C. 20101 et seq.

V. REFERENCES

- a. NPR 7120.5 NASA Space Flight Program and Project Management Requirements
- b. NPD 8610.7 Launch Services Risk Mitigation Policy for NASA-Owned and/or NASA-Sponsored Payloads/Missions
- c. NPR 8705.4 Risk Classification for NASA Payloads
- d. Charter of the NASA Small Spacecraft Coordination Group (SSCG)
- e. NC 1000.15 Expendable Launch Vehicle (ELV) Flight Planning Board (FPB) Charter

VI. RESPONSIBILITY

- a. The Deputy Associate Administrator for Flight Programs (DAAP) as delegated by the Associate Administrator for SMD shall:
 - (1) Ensure SMD compliance with this policy document.
 - (2) Determine the potential for excess capacity after selection of the primary payload in cooperation with LSP.

- (3) Oversee the process of offering secondary capacity on SMD missions to support science, technology and exploration investigations by NASA payloads from other Mission Directorates, other U.S. Government Agencies, and NASA's International partners.
- (4) Oversee the evaluation and prioritization of secondary payload opportunities, consistent with this policy.
- (5) Provide the final SMD Directorate Program Management Council (DPMC) recommendation of prioritized secondary payloads to the Flight Planning Board (FPB) to be considered for manifest.

b. Each SMD Science Division shall:

- (1) Include an option for ESPA-class secondary launch accommodations in all appropriate mission solicitations.
- (2) In cooperation with LSP, provide a catalog of rideshare capabilities and rideshare carrier options with relevant payload parameters for relevant and applicable solicitation calls. This information will be made available on the Science Office of Mission Assessment and Small Spacecraft Systems Virtual Institute (S3VI) websites.
- (3) Allocate within their budget the funding to procure ESPA Integration Services (ESPA-IS) and Launch Vehicle Integration Services, as defined in Appendix C, Section 5, of this policy. The budget for these items will be maintained outside of the budget for the primary mission, so as to minimize the effect of this policy on the lifecycle cost of the primary mission. The budget for the ESPA ring integration services may be supported by a Program Management or other applicable WBS line item within the budget of the sponsoring Division.

c. The Small Spacecraft Coordination Group (SSCG) shall:

- (1) Identify and maintain a list of potential ESPA-class payloads seeking launches, including payload candidates from NASA and other U.S. government agencies, on a best effort basis.
- (2) Operate a website through the S3VI that consolidates and shares public information on ESPA-class launch accommodation opportunities and capabilities. (<https://www.nasa.gov/smallsat-institute>).
- (3) Maintain a repository for a NASA-specific rideshare user's guide, approved launch/rideshare forecasts and rideshare/small satellite points of contact. (Note that per the SSCG Charter, the FPB will ensure existing applicable NASA policies are appropriately applied for launch service procurement and launch risk management, and that NASA acts in a coordinated and consistent manner regarding rideshare / secondary payload opportunities).

d. The Launch Service Program shall:

- (1) Include the integrated ESPA ring requirements in the launch vehicle procurement documents, when appropriate.
 - (2) Develop solicitation-specific catalog of rideshare capabilities and rideshare carrier options with relevant payload parameters for applicable solicitation calls.
 - (3) Identify launch rideshare accommodation opportunities for NASA missions, in conjunction with the primary mission and the Launch Vehicle Contractor and provide this information to the S3VI, as representatives on the SSCG.
- e. The Secondary Payload Provider shall:
- (1) Fund all costs associated with payload development, modeling, assembly, and integration and testing. This includes the delivery of all relevant interface documents, and travel to support all phases of secondary payload integration onto the ESPA ring, and the populated ESPA ring onto the LV.
 - (2) Fund all costs associated with launch delays, including secondary payload storage and workforce costs.
 - (3) Fund mission unique costs, such as additional electrical connectors and T-0 purge requirements.

VII. MEASUREMENT/VERIFICATION

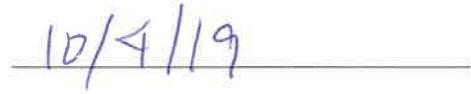
- a. Compliance with this document is verified by documenting viable rideshare options in prioritized order in an SMD Decision Memo (DM) and in FPB minutes documenting manifest decisions for applicable launches.

SIGNATURE BLOCK

Concurred by:



**Sandra Connelly
Deputy Associate Administrator for Programs
Science Mission Directorate**



Date

Approved by:



**Thomas Zurbuchen, Ph.D.
Associate Administrator
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Date

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APPENDIX A: ACRONYMS

CLA	Coupled Loads Analysis
CM	Centimeters
DAAP	Deputy Associate Administrator for Programs
DAAR	Deputy Associate Administrator for Research
DM	Decision Memorandum
DPMC	Directorate Program Management Council
EELV	Evolved Expendable Launch Vehicle
ESPA	EELV Secondary Payload Adapter
FPB	Flight Planning Board
KDP	Key Decision Point
KGS	Kilograms
LBM	Pounds mass
LRD	Launch Readiness Date
LSP	Launch Services Program
LSTO	Launch Service Task Order
LV	Launch Vehicle
MD	Mission Directorate
NASA	National Aeronautics and Space Administration
NC	NASA Charter
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
SLS	Space Launch System
SMD	Science Mission Directorate
SOMA	Science Office of Management Assessment
SSCG	Small Spacecraft Coordination Group
S3VI	Small Spacecraft Systems Virtual Institute

APPENDIX B: DEFINITIONS

ESPA ring - A payload adapter for small-class secondary payloads on medium and intermediate/heavy class launch vehicles.

Standard ESPA ring - A payload adaptor that holds up to six secondary accommodations, not to exceed 710 pound-mass (lbm) or 322 kilograms (kgs) each.

ESPA Grande – An ESPA ring that holds up to four secondary accommodations, each with a mass of up to 1026 lbm or 465 kgs.

ESPA Grande with five ports – An ESPA ring that holds up to five secondary accommodations, each with a mass of up to 1026 lbm or 465 kgs.

ESPA-class payload – a free-flying payload that attaches to any variant of an ESPA ring.

Excess capacity - For the purposes of this document, excess capacity means excess ascent performance and other mission resources that would allow secondary payload opportunities.

Integrator - The Integrator is responsible for the management, development, integration, test, and delivery of the integrated ESPA flight system.

NASA payload - A payload developed by a NASA Mission Directorate or office, either in-house or under contract.

SMD-sponsored payload - A payload provided by a non-NASA entity under formal agreement with SMD (e.g., international cooperative payloads, NASA space commercialization payloads).

Payload - A specific complement of instruments, sensors, equipment, and support hardware carried into space to accomplish a mission or a discrete activity in outer space. Specific characteristics: Personnel are not considered a payload nor a part of a payload.

Primary payload - A payload for which a launch vehicle is procured. Specific characteristics: A primary payload typically defines the orbital placement/trajectory, flight design, critical path of the mission integration including launch preparation process, and mission operations. The primary payload's organization funds the launch service.

Secondary payload - A payload that is manifested subordinate to a primary payload and, therefore, is subordinate in launch date and orbit selection. Specific characteristics: A single secondary payload does not justify a dedicated launch. A secondary payload is usually independent of the primary payload, providing its own power and communication system, but is dependent on a primary payload's launch vehicle to achieve orbit/desired trajectory. A secondary payload does not drive the launch mission's orbit selection, flight design, or mission integration critical path without agreement from the primary payload. The secondary payload does not cause a launch delay without agreement from the primary payload. The secondary payload must have available an appropriate fidelity mass simulator to meet the schedule needs of the primary payload should the secondary be unable to support the launch date. There can be more than one secondary payload on a launch.

Small Spacecraft Coordination Group – A NASA group that provides cross-agency coordination for small spacecraft missions.

APPENDIX C: SMD RIDESHARE PROCESS

1. SOLICITATIONS

For applicable solicitation calls, SMD will include the following: a catalog of rideshare capabilities and rideshare carrier options with relevant payload parameters that will be available on the Science Office of Mission Assessments (SOMA) and S3VI websites. All rideshare-referenced

documentation for inclusion in the solicitation will be approved by the SMD Deputy Associate Administrator for Research (DAAR) and filed in the solicitation program library at the SOMA website at <https://soma.lrc.nasa.gov> and solicitation language will be included in the standard solicitation templates.

2. FACTORS FOR CONSIDERATION OF SECONDARY PAYLOADS

For secondary payloads seeking rideshare launch accommodations and that are not part of the solicitation process, the following are factors for consideration of potential candidates:

- a. Spacecraft readiness and schedule alignment to the primary mission;
- b. Suitability and compatibility of the secondary payload deployment parameters to the primary mission;
- c. An ability to support and contribute to NASA's science, exploration, or technology development objectives.

3. PRIORITIZATION PROCESS FOR SECONDARY PAYLOADS

Secondary payloads will be considered from the following offices, organizations, or entities in priority order:

- a. SMD Division sponsoring the primary payload including the Division responsible for reimbursable programs;
- b. Other SMD Divisions
- c. Other NASA Mission Directorates
- d. Other Government Agencies not represented by SMD Divisions
- e. International Partners in accordance with international agreements for international collaborative efforts relating to science, technology, and exploration. International Agreements will be coordinated through NASA Office of Interagency and International Relations.

Due to LV processing timelines, the secondary manifest will be decided no later than 24 months prior to the launch date.

In situations where SMD is representing another Federal Agency using reimbursable funds to procure a launch service in support of a reimbursable primary mission, the sponsoring agency will be given the first opportunity to identify rideshare secondary payloads. If the funding agency does not identify internal or partner payload candidates to utilize all available excess capacity, SMD, by launch

minus 24 months, will use the process outlined below for identifying potential rideshare opportunities. SMD will coordinate with the funding agency to perform accommodation studies of any SMD proposed secondary payloads to establish compatibility with the primary mission and to identify any impact on launch service costs that would be driven by the SMD-proposed secondary payloads. Once this evaluation is complete, the funding Agency retains the right to decide whether SMD-proposed rideshare payloads will be manifested. The participating agencies will determine the distribution of rideshare costs based on applicable law. A more detailed prioritization process for rideshare accommodations on reimbursable programs will be covered separately to this policy.

4. SELECTION PROCESS FOR SECONDARY PAYLOADS

The following describes the decision process for determining how the selection of candidate secondary payloads for launch accommodations on SMD primary missions will be determined.

1. When a primary mission is initiated, a rideshare capability will be incorporated unless technically infeasible. As the mission matures, the potential excess capacity will be refined, as necessary. During this process, the rideshare options will mature and the NASA rideshare database will be updated regularly, at a minimum at major key decision points.
2. After the Launch Service Task Order is awarded by LSP, when the specific launch service for the primary mission is identified, a high-fidelity mission design analysis will be conducted to determine precise excess performance. At that point, the secondary accommodation (e.g., ESPA on or off) will be formalized at the FPB. If it is not clear whether a rideshare capability can be provided, the SMD division sponsoring the primary mission makes the final determination, which will be documented in FPB minutes. If the primary mission uses all launch capability and there is no excess capacity available, then no ESPA ring will be flown.
3. If there is excess capacity, the SMD Division sponsoring the primary mission determines if this excess capacity can be used internally to that Division.
4. If the Division sponsoring the primary payload cannot use all excess capacity, the DAAP conducts a poll of other SMD Divisions and technology offices to determine if the excess launch vehicle capability can be used within SMD.
5. If Divisions submit more candidates than available slots, then a special DPMC will be held to prioritize SMD secondary candidates. The factors and considerations for prioritizing secondary payloads amongst Divisions are (a) national importance; (b) relevance to SMD science, technology, and exploration goals; (c) other launch opportunities; (d) secondary payload readiness; (e) schedule alignment with the primary payload Launch Readiness Date (LRD); (f) risk to the primary payload; (g) launch constraints; (f) orbit compatibility to primary mission; (g) Agency priorities; (h) SMD partner priorities. This is not a prioritized list.
6. The decision will be documented in a Decision Memo.

7. If, after SMD Divisions are polled, there is remaining excess capacity, then other NASA Mission Directorates are polled by the DAAP to determine if this capacity can be used within NASA. Identified payloads will be prioritized according to agency priorities.
8. The SSCG will then be notified that excess capacity is available and will assist SMD, based on its current NASA and other U.S. Government Agency payload candidate list. The SSCG may have access to additional data from other sources about potential secondary candidates that could be utilized, with the following priority:
 - a. Other Government Agencies not represented by SMD Divisions;
 - b. International Partners in accordance with international agreements.
9. After all candidate secondary payloads are identified, LSP will assess compatibility of the candidates with the launch performance and primary mission orbit. Additionally, the integration services organization will assess whether the designs of the secondary candidates would be compliant with the "Do No Harm" requirements. Using these assessment results, a special DPMC will be held to prioritize and select the secondary payloads. All decisions involving SMD missions will be documented in a SMD Decision Memo or other agreement document.
10. The FPB will provide final approval and will manifest the secondary payloads using the FPB process.
11. A list of potential back-up payloads for each NASA rideshare opportunity will be maintained by the LSP. LSP will assess compatibility with the applicable mission and provide constraints and replacement costs based on timing with respect to launch. If a secondary payload fails to meet required milestones or requirements, depending on where the mission is within the integration process, it may be replaced with an alternate secondary payload from the back-up list or be replaced with a mass simulator, with SMD and FPB approval.
12. Once a secondary is selected as part of the final manifest, the secondary payload providers will be notified.

5. DEFINITION OF ESPA INTEGRATION SERVICES (ESPA-IS) AND LAUNCH VEHICLE (LV) INTEGRATION SERVICES

The following describes ESPA Integration Services (ESPA-IS) and Launch Vehicle (LV) integration services that the primary payload sponsoring Division shall pay for.

1. ESPA-IS includes all procurement, integration, and analysis associated with the integration of secondary payloads onto an ESPA ring. This includes:
 1. ESPA Integrator contract fees;
 2. Physical integration of secondary payloads onto an ESPA ring;

3. All interface control documents, modeling, testing, and analysis of the integrated system;
 4. All procurement costs, including procurement of the ESPA ring and all ancillary hardware, such as: separation systems, mass simulators for the secondary payloads, any sequencer units, and all associated harnessing.
2. LV Integration includes integration of the populated ESPA ring onto the launch vehicle, and all associated modeling, testing, and analysis. This includes:
1. Physical integration of populated ESPA ring onto LV;
 2. All LV analyses (thermal, coupled loads, trajectory, electrical, EMI/RFI, etc.).

