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Defense Primer: National Security Space Launch

Introduction

The National Security Space Launch (NSSL) is a U.S. government program that enables acquisition of launch services, aimed at ensuring continued access to space for critical national security missions. The U.S. Air Force oversaw NSSL's predecessor program, the Evolved Expendable Launch Vehicle (EELV), and awarded four companies contracts to design a cost-effective launch vehicle system. The Department of Defense (DOD) acquisition strategy was to select one company to ensure national security space (NSS) launches were affordable and reliable. The EELV effort was prompted by significant increases in launch costs, procurement concerns, and the lack of competition among U.S. companies. Today, the NSSL program's main priority is mission success. A RAND study released April 2020 identified a magnitude of risk associated with assured access to space. As Congress continues its oversight of NSSL, it may consider examining DOD's plan on the prioritization of the launch-related risks to ensure continued access to space and 100% mission success.

A major concern in Congress and elsewhere over U.S. reliance on a Russian rocket engine (RD-180), used on one of the primary national security rockets for critical national security space launches, was exacerbated by the Russian backlash over the 2014 U.S. sanctions against its actions in Ukraine. Moreover, significant overall NSSL program cost increases and unresolved questions over individual launch costs, along with legal challenges to the Air Force contract awards by space launch companies, prompted legislative action. In the John S. McCain National Defense Authorization Act (NDAA) for Fiscal Year 2019, Congress directed the program to find non-Russian engines. It also renamed the EELV to the NSSL program to reflect a wider mission that would consider both reusable and expendable launch vehicles.

The Space and Missile Systems Center (SMC), together with the National Reconnaissance Office (NRO), released a request for proposals in May 2019 to award two domestic launch service contracts. On August 7, 2020, the U.S. Space Force competitively awarded two Firm-Fixed-Price, Indefinite Deliver Requirement contracts to United Launch Alliance (ULA) and Space Exploration Technologies Corporations (SpaceX) for Phase 2 of the NSSL program. These two companies will share the responsibility for launching U.S. military and intelligence satellites through 2027. ULA will receive approximately 60% of the contract requirements, similarly SpaceX 40%. NSS launch has been a leading legislative priority in the defense bills over the past few years, and with the increasing number of commercial launch providers and more competition, it will likely continue to be a legislative priority.

Background

The origins of the NSSL program date back to 1995, after years of concerns within the Air Force and space launch community over increasing cost and decreasing confidence in the continued reliability of national access to space. The purpose of EELV was to provide the United States affordable, reliable, and assured access to space with two families of space launch vehicles. Initially only two companies competed: Boeing produced the Delta IV launch vehicle, and Lockheed Martin developed the Atlas V. Overall, the program provided critical space lift capability to support DOD and intelligence community satellites, together known as NSS missions.

The EELV program evolved modestly in response to changing circumstances, and the Air Force approved an EELV acquisition strategy in November 2011, revising it in 2013. That strategy was designed to (1) sustain two major independent rocket-powered launch vehicle families to reduce the chance of launch interruptions and to ensure reliable access to space; (2) license and stockpile the Russian-made RD-180 heavy-lift rocket engine, a critical component of the Atlas V; (3) pursue a block-buy commitment to a number of launches through the end of the decade to reduce launch costs; and (4) increase competition to reduce overall launch costs. The Air Force and others viewed the overall EELV acquisition strategy as having successfully reduced launch costs while demonstrating highly reliable access to space for DOD and the intelligence community.

NSSL Program Today

The U.S. Space Force, the sixth branch of the Armed Forces, established on December 20, 2019, is responsible for the military space launch mission. The NSSL program is managed by the Launch Enterprise Systems Directorate of SMC, Los Angeles Air Force Base. The NSSL program consists of four launch vehicles: Atlas V and Delta IV Heavy (both provided by ULA of Denver, CO) and Falcon 9 and Falcon Heavy (both provided by SpaceX of Hawthorne, CA).

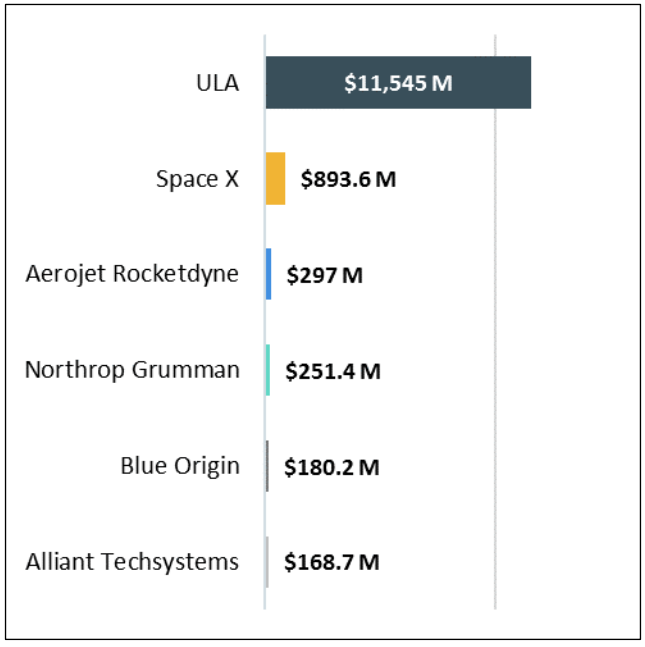
NSS launches support the Space Force, Navy, and NRO. More specifically, the Atlas V has launched commercial, civil, and NSS satellites into orbit, including commercial and military communications satellites, lunar and other planetary orbiters and probes, earth observation and military research satellites, weather satellites, missile warning and NRO reconnaissance satellites, a tracking and data relay satellite, and the X-37B space plane (a military orbital test vehicle). The Delta IV has launched commercial and military communications and weather satellites and missile warning and NRO satellites.

DOD expects to achieve cost saving through acquisitions and operability improvements through use of common components and infrastructure, standard payload interfaces, standardized launch pads, and reductions in on-pad processing. To improve acquisitions, the program offers block buys of launch vehicles and competition between certified providers. The competitions are conducted through two contract vehicles: Launch Service Agreements (LSA) and Launch Service Procurement (LSP) awards:

- Launch Service Agreement (LSA) awards are a set of three Air Force Research, Development, Test, and Evaluation awards intended to facilitate the development of three domestic launch system prototypes. DOD awarded LSA's to ULA, Northrop Grumman, and Blue Origin in October 2018.
- Launch Service Procurement (LSP) is an ongoing procurement competition that awarded its Phase 2 contracts on August 7, 2020—a five-year procurement of approximately 34 launches starting in 2022.

United Launch Alliance, Northrop Grumman, SpaceX, and Blue Origin submitted bids for Phase 2, with each company proposing its rocket design: Vulcan, OmegA, Falcon, and New Glenn, respectively. Northrop Grumman and Blue Origin were not selected to receive Phase 2 contracts. Previously, Phase 1 and Phase 1A awards were given to ULA and SpaceX. DOD has identified 18 active contracts for the NSSL program, with obligations awarded to six companies (see **Figure 1**).

Figure 1. Selected NSSL Contract Obligations, by Company, 2012-2019



Source: CRS analysis of the Federal Procurement Data System.
Notes: Totals as of July 2019, in millions of dollars. Northrop Grumman has acquired Orbital-ATK, previously known as Alliant Techsystems.

ULA and SpaceX are currently the only space launch providers certified to launch NSS payloads into orbit.

Implications for Congress

Although widespread support for the NSS requirement to promote robust competition and assured access to space exists across Congress and national space community stakeholders, challenges to achieving these goals remain. The recurring challenge since the start of the NSSL program has been how best to pursue this requirement while driving down costs through competition and ensuring launch reliability and performance. The Space Force decision to select only two launch providers and award two separate LSP contracts in August 2020 is not without potential implications and could have second- and third-order effects on operational capabilities.

Congress may consider whether the strategy's cost-benefit analysis warrants further research. Since only two launch providers were chosen for LSP contracts in Phase 2, and the companies not selected (Northrop Grumman and Blue Origin) lose their LSA funds received from the Air Force, these companies could potentially be faced with (1) the choice of abandoning NSSL development to focus on competing in the commercial launch sector, or (2) investing vast company reserves to continue development on its own. Furthermore, DOD selection of only two launch providers could mean fewer options for an increasingly diverse range of NSS mission demands and possibly limit competition in the launch market once again. Congress may consider

- directing the Space Force to provide a report on the cost-benefit analysis of selecting more than two launch providers in future phases;
- drafting language in future NDAAs to authorize additional funds that allow the Space Force to diversify its launch provider options by continuing to provide development funds through LSA awards to launch companies not selected for LSP contracts in Phase 2; and/or
- directing the Space Force to provide a report on the cost saving and associated risk of using reusable launch vehicles for future solicitations.

Lastly, efforts to transition away from the RD-180 to a domestic U.S. alternative engine or launch vehicle are not without technical, program, or schedule risks. Even with a smooth, on-schedule transition away from the RD-180 to an alternative engine or launch vehicle, the performance and reliability record achieved with the RD-180 to date would likely not be replicated until well beyond 2030; the RD-180 has approximately 81 consecutive successful civil, commercial, and NSS launches since 2000.

CRS Products

CRS Report R46211, *National Security Space Launch*, by Stephen M. McCall

Stephen M. McCall, Analyst in Military Space, Missile Defense, and Defense Innovation

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