

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

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In the Matter of	)	
	)	
<b>TECHNOLOGICAL ADVISORY COUNCIL</b>	)	ET Docket No. 17-215
	)	
Technical Inquiry Into Reforming	)	
Technical Regulations	)	
	)	
<b>ALLOCATION OF SPECTRUM FOR</b>	)	ET Docket No. 13-115
<b>NON-FEDERAL SPACE LAUNCH</b>	)	
<b>OPERATIONS</b>	)	
	)	

**COMMENTS OF SPACE EXPLORATION TECHNOLOGIES CORP.**

Space Exploration Technologies Corp. (“SpaceX”) submits these comments in response to the Public Notice seeking comment to assist the Technological Advisory Council (“TAC”) in its investigation to determine whether changes to the Commission’s technical regulations could increase efficiency and decrease regulatory burdens consistent with the purposes and responsibilities of the Commission.<sup>1</sup> In these comments, SpaceX focuses on a singular issue ripe for regulatory streamlining: licensing spectrum for use in commercial launch activities. Reform in this area would comprise an important component of a broader government-wide initiative toward increased efficiency and lowering barriers to the commercial use of space. For example, during the first meeting of the recently revived the National Space Council,<sup>2</sup> Vice President

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<sup>1</sup> See Public Notice, “Office of Engineering and Technology Announces Technological Advisory Council (TAC) Technical Inquiry Into Reforming Technical Regulations,” 32 FCC Rcd. 6672 (OET 2017) (“Public Notice”). Because these comments discuss proposals raised in a pending notice of proposed rulemaking (ET Docket No. 13-115), SpaceX is filing them in that proceeding as well.

<sup>2</sup> See Presidential Executive Order on Reviving the National Space Council (June 30, 2017), *available at* <https://www.whitehouse.gov/the-press-office/2017/06/30/presidential-executive-order-reviving-national-space-council>.

Mike Pence directed the Secretaries of Commerce and Transportation, along with the Director of the Office of Management and Budget, to conduct a full review of the U.S. regulatory framework for commercial space in order to identify potential reforms that could streamline operations.<sup>3</sup>

As discussed below, the Commission has an important opportunity to support an increase in the efficiency of commercial launch activities by acting on a long-pending rulemaking to allocate specific frequency bands for commercial launch activities and moving briskly to adopt service rules to implement that proposal. This would allow for streamlining of the current multiple-authorizations-per-mission licensing approach, reducing the administrative burden on Commission staff and enabling the increasing number and pace of U.S. commercial launch missions from current providers and new market entrants. Moreover, by identifying and endorsing the steps needed to streamline this licensing process, the TAC also would prepare the Commission to play a significant role in promoting the larger objective of the newly-revived National Space Council.

#### **A. SPACEX IS LEADING A DRAMATIC INCREASE IN THE TEMPO OF COMMERCIAL LAUNCH ACTIVITIES**

SpaceX is a private company founded in 2002 by Chief Executive Officer and Lead Designer Elon Musk to revolutionize space technologies, with the ultimate goal of enabling humanity to become a multi-planetary species. The company designs, manufactures, and launches advanced rockets and spacecraft. SpaceX is the world's leading provider of launch services, and has over 70 future missions on its manifest. It currently operates from launch facilities at Cape

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<sup>3</sup> See, e.g., Jeff Foust, "National Space Council calls for human return to the moon," SPACE NEWS (Oct. 5, 2017), available at <http://spacenews.com/national-space-council-calls-for-human-return-to-the-moon/>.

Canaveral Air Force Station and Kennedy Space Center, Florida, and Vandenberg Air Force Base, California, and also has a private launch facility under construction in Brownsville, Texas.

SpaceX provides launch services to NASA, the U.S. Department of Defense, and a wide portfolio of commercial and international government customers. Since its founding, SpaceX's thriving space transportation services business has achieved a series of historic milestones. For example, in December 2010, SpaceX became the first private company ever to successfully launch and return a spacecraft (Dragon) from low-Earth orbit. In May 2012, the company made history again when Dragon berthed with the International Space Station ("ISS"), delivered cargo, and returned safely to Earth – a technically challenging feat previously accomplished only by nations. In December 2015, SpaceX successfully returned a first stage rocket booster to land after carrying a payload to space. It has completed eighteen landings of a first stage booster on land and upon droneships at sea. Earlier this year, SpaceX achieved the first reuse of such a flight-proven orbital class rocket – a historic milestone on the road to full and rapid rocket reusability that promises further acceleration of launch activities in the future.

Particularly in recent years, SpaceX's launch tempo has escalated significantly. For example, in June and again in October, SpaceX successfully completed two separate satellite launches from opposite coasts of Florida and California within a three-day period. On October 11, 2017, SpaceX completed its fifteenth launch this year, with its next launch scheduled for October 30, 2017. Using the autonomous flight safety system SpaceX developed in cooperation with the U.S. Air Force, the total number of launches that all Air Force facilities can support is expected to double to 48 per year.<sup>4</sup> Further increases in launch cadence will be necessary by 2019 to support

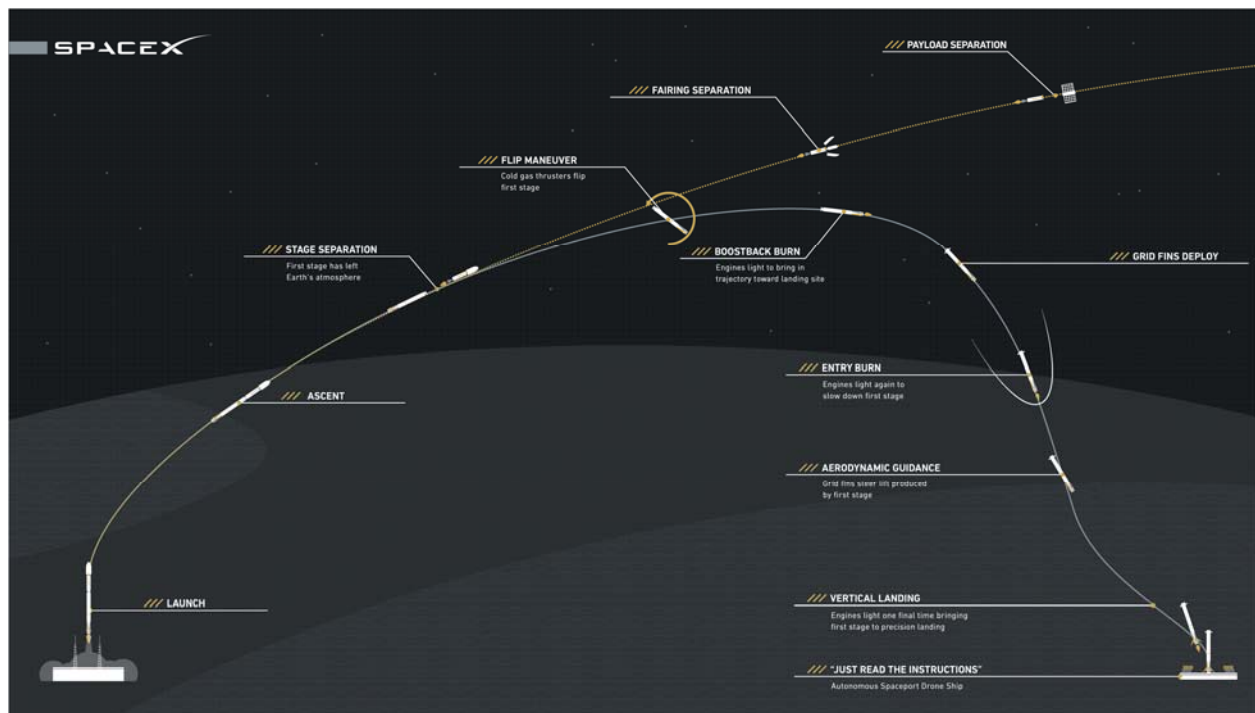
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<sup>4</sup> See Mike Fabey, "SpaceX forces Air Force to revise launch mindset," SPACE NEWS (Sept. 20, 2017) (discussion by Brig. Gen. Wayne Monteith, Commander, 45<sup>th</sup> Space Wing, USAF), *available at* <http://spacenews.com/spacex-forces-air-force-to-revise-launch-mindset/>.

the new generation of non-geostationary orbit (“NGSO”) satellite systems, which propose to deploy thousands of satellites in the aggregate over the next decade.

## **B. COMMERCIAL LAUNCH PROVIDERS DEPEND UPON THE COMMISSION FOR SPECTRUM TO SUPPORT LAUNCH ACTIVITIES**

Figure 1 below illustrates the various activities involved in a typical SpaceX launch and recovery mission. During this process, SpaceX relies upon spectrum licensed by the Commission



**Figure 1. Typical SpaceX Launch and Recovery Mission**

for several specific purposes to support its launch activities. From the time a rocket is launched until the second stage burn has been completed, SpaceX relies on licensed spectrum to provide telemetry, radiolocation data, and video to mission control. After the first stage boosters have separated, it provides telemetry and video throughout the recovery process until landing. The fairing that covers and protects the rocket’s payload uses additional spectrum to provide telemetry from the time the fairing separates from the rocket until it has been recovered. And on Dragon missions, SpaceX uses spectrum throughout the mission to support operations, telemetry, and

recovery. As SpaceX moves to introduce its next rocket innovation, the Falcon Heavy rocket, the need for spectrum to support booster recovery will triple as SpaceX plans to land each of the three first stage boosters at three different landing locations.<sup>5</sup>

### **C. THE CURRENT LICENSING PROCEDURE IS INEFFICIENT FOR LAUNCH PROVIDERS AND BURDENSOME FOR REGULATORS**

Unfortunately, the spectrum used to support commercial launch operations is not currently allocated for commercial use under the U.S. Table of Frequency Allocations. Rather, it is allocated for a variety of Federal government uses, including space operations.<sup>6</sup> Accordingly, the only licensing vehicle for commercial launch spectrum available to the Commission for this non-conforming use is a special temporary authorization (“STA”). Moreover, because there are no rules for licensing this spectrum, the Commission’s approach is to license this spectrum under the Commission’s Part 5 experimental licensing rules.

Reliance upon STAs for launch spectrum licensing has several significant drawbacks. First, STAs are issued on case-by-case basis for each mission, with no expectation that a similar experimental STA would be approved for future launches.<sup>7</sup> This means that each and every launch is a new licensing event, and grant of one STA does not ensure the grant of a similar STA for the next launch. Second, STAs are valid for a maximum period of six months,<sup>8</sup> which means that they cannot be issued too far before a scheduled launch – adding unnecessary uncertainty in the lead-up to launch – and might not extend far enough if a launch has to be delayed.<sup>9</sup> Third, STAs are

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<sup>5</sup> An animated simulation of a Falcon Heavy launch mission can be found at <https://www.youtube.com/watch?v=4Ca6x4QbpoM>.

<sup>6</sup> See *Amendment of Part 2 of the Commission’s Rules for Federal Earth Stations Communicating with Non-Federal Fixed Satellite Service Space Stations*, 28 FCC Rcd. 6698, ¶ 65 (2013) (“*Launch Spectrum NPRM*”).

<sup>7</sup> See *id.*, ¶ 70.

<sup>8</sup> See 47 C.F.R. § 5.61(a)(1).

<sup>9</sup> Although an experimental license can have a longer term of up to five years, the Commission’s practice has not been to authorize such longer-term authorizations given the primary Federal allocations in the band.

issued on a non-interference basis. This means that, although commercial launch operators use this spectrum for mission-critical functions, they must deal with the uncertainty of knowing that their status is lower than that of every other operator in the bands they use.

Given the uncertainty inherent in the STA process, SpaceX has tried to take whatever steps are available in order to improve the prospects of receiving timely licensing approval. For example, even before filing an STA application with the Commission, SpaceX works to pre-coordinate its proposed spectrum usage with interested federal agencies, such as NASA and the U.S. Air Force. Subsequent to this pre-coordination, SpaceX formally submits the STA application to the Commission's Office of Engineering and Technology ("OET"), which then coordinates on behalf of SpaceX with the National Telecommunications and Information Administration ("NTIA") and all other Federal users of the band. Unfortunately, the applicants have very little insight into the interagency review process conducted through the Interdepartment Radio Advisory Committee ("IRAC"), and the status of the application is often unknown until very close to the launch date. And because each launch currently requires its own authorization, OET staff must engage with NTIA and IRAC on behalf of launch providers on a nearly continuous basis.

For these reasons, the STA process currently used to authorize spectrum use in commercial launch operations does not serve the burgeoning commercial launch industry or its regulators well. Moreover, the limitations in the current process identified above will grow increasingly pronounced as commercial space launches and other commercial operations in orbit grow in volume and frequency, and as new launch providers enter the U.S. market. The current permission licensing process creates significant and unnecessary business uncertainty, both in terms of approval prior to scheduled launch date and with regard to the inherent uncertainty of non-

interference status. Given the substantial financial and technical investment in each launch campaign – independent of customer in-orbit deadlines to realize material revenues from their ongoing businesses – and the demand on regulatory resources, a more scalable process that reflects the evolution of U.S. commercial launch services should be put in place to increase efficiency and decrease regulatory burden.

**D. THE COMMISSION SHOULD PROCEED EXPEDITIOUSLY TO ADOPT PENDING PROPOSALS THAT WOULD BEGIN TO STREAMLINE THE LICENSING OF COMMERCIAL LAUNCH SPECTRUM**

Over four years ago, the Commission issued the *Launch Spectrum NPRM*, initiating a rulemaking to allocate spectrum to support commercial space launch operations. Specifically, the Commission proposed to add footnotes to the U.S. Table of Frequency Allocations that would provide primary non-Federal allocations for the Space Operation service to provide launch telemetry, the Radiolocation service for tracking of launch vehicles, and the Aeronautical Mobile service for use in transmitting self-destruct signals.<sup>10</sup> Adding non-Federal allocations to these bands would enable Commission licensees to operate on an interference-protected basis, and eventually (after adoption of service rules) to be licensed outside of the experimental authorization regime.

In response to these proposals, several parties joined SpaceX in supporting such a new spectrum allocation. Importantly, NTIA endorsed the concept as well on behalf of federal users of the bands, arguing that “[t]he addition of these non-federal allocations on a shared basis is a necessary and important initial milestone in providing protected spectrum access for commercial launch operations.”<sup>11</sup> Such an allocation would be a significant step toward streamlining

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<sup>10</sup> See *Launch Spectrum NPRM*, ¶¶ 65-87.

<sup>11</sup> Letter from Lawrence E. Strickling to The Hon. Tom Wheeler, ET Docket No. 13-115, at 4 (Sept. 30, 2016).

commercial launch spectrum licensing in the future, an efficiency that will become even more important with the increasing cadence of commercial launch and reentry activities, and the introduction of new launch companies joining the U.S. commercial sector.

This impact on commercial launch spectrum licensing efficiency would be seen in two phases. In the near term, a commercial allocation would enable the Commission to move past short-term, mission-by-mission STAs and instead issue conventional experimental authorizations, which can remain valid for up to five years.<sup>12</sup> This would eliminate the need for repeated STA applications for similar missions from a single launch site, including the submission of sensitive (even ITAR-protected) materials and the inevitable uncertainty of grant. As the Commission has recognized, “[g]iven that a single launch can cost millions of dollars, commercial launch providers should not have to assume the risk that launches may have to be postponed or cancelled if an experimental STA is not timely granted.”<sup>13</sup> Issuing conventional experimental authorizations would also give launch providers standing to coordinate directly with NTIA and relevant federal agencies, relieving the burden on Commission staff. Thus, the new allocation would result in a licensing process that gives commercial launch providers both greater certainty and greater flexibility than the current reliance on STAs.

In the longer term, the proposed commercial allocations would serve as a critical initial step toward considering standard, interference-protected licenses outside the experimental regime. As the Commission recognized, “[a]llocation status for commercial launch providers would enable the Commission to develop service rules for issuing authorizations using well-defined application

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<sup>12</sup> See 47 C.F.R. § 5.71(a) (conventional experimental authorizations may be issued for a term of up to 5 years with proper justification).

<sup>13</sup> *Launch Spectrum NPRM*, ¶ 71.



and coordination processes.”<sup>14</sup> The TAC should urge the Commission to move expeditiously to issue a follow-on notice of proposed rulemaking to adopt service rules for these new spectrum allocations. For this purpose, SpaceX proposes that the Commission create a new “Part 86” that establishes a process for licensing spectrum for launch operations on a regularized (*i.e.*, non-experimental) basis so that operators have assurance of long-term access to co-primary spectrum for commercial launch operations.

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SpaceX commends the TAC for undertaking this investigation into changes to the Commission’s technical rules that could increase efficiency and decrease regulatory burdens. Licensing spectrum for use in commercial launch activities presents a paradigm case for action, as there is both a demonstrable and growing need for greater efficiency and a ready-made vehicle available for achieving it. The TAC should urge the Commission to act on its long-pending proposals to allocate spectrum used to support commercial launches, and to issue follow-on proposals for service rules to regularize licensing of such spectrum. By taking these steps, the Commission could streamline its processes and thereby promote a fast-growing industry sector in support of the national interest identified by the National Space Council.

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<sup>14</sup> *Id.*

Respectfully submitted,

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