SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION: QUESTIONS FOR THE RECORD

HEARING ON REOPENING THE AMERICAN FRONTIER: PROMOTING PARTNERSHIPS BETWEEN COMMERCIAL SPACE AND THE U.S. GOVERNMENT TO ADVANCE EXPLORATION AND SETTLEMENT
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Written Questions Submitted to Mr. Tim Hughes, Senior Vice President for Global Business and Government Affairs, SpaceX

Submitted by Senator Dan Sullivan

Challenges Hindering DOD-Commercial Partnerships

Question 1. Earlier this year, in response to a provision that I included in the FY2017 National Defense Authorization Act (NDAA), the Department of Defense (DOD) released an Arctic strategy that among other points, highlights severe challenges caused by the limited satellite and terrestrial communications above 65 degrees north. When the DOD needs to quickly address gaps in capabilities, commercial partnerships can— where appropriate—play a key role in filling these needs.

What are the primary challenges that have hindered or prevented you from working with the U.S. government to fill critical gaps in U.S. space capabilities, like the domain awareness and communications gaps in the Arctic?

Answer. SpaceX agrees that commercial partnerships can serve to rapidly support the development and deployment of capability for the Department of Defense, as well as other U.S. Government entities. We recommend the Government make fuller use of innovative federal contracting strategies, like Other Transaction Authority (OTA) and commercial contracting methods in leveraging commercial capability. Specifically, some challenges include:

- Government requirements that add cost and schedule delay;
- Vague or poorly defined requirements;
- Use of non-commercial contracts and the imposition of unnecessary or inappropriate contract clauses and requirements onto commercial contracts;
- Costs and time associated with certification of commercial products and commodities for Government use;
- Number and scope of compliance documents associated with DOD contracts;
- Onerous and time-consuming proposal process for DOD contracts; and
- Unnecessarily slow acquisition processes.

Internet Access in Rural Areas

Question 2. In Alaska, many places do not have any connectivity and many times are not even connected by road. It is costly to deploy telecommunications infrastructure, and while these communities are extremely innovative, a lack of connectivity hinders business growth and increased economic activity. Commercial space provides the possibility of increased communications, including satellite-based broadband internet, at a reduced cost. Especially if the cost of launches continues to decline, this could provide real benefits to consumers in extremely rural places like Alaska.

How can recent advances in commercial space help provide broadband-level internet to the most rural areas?

Answer. SpaceX agrees that even the latest terrestrial telecommunications infrastructure is often costly (or cost-prohibitive) with respect to extending broadband services to remote areas, particularly to certain terrains like those in Alaska. We also recognize the undeniable social and economic value that comes when communities can access quality, high-speed broadband. The disparity in available service to rural and "hard-to-reach" areas is the result of the heavy, up-front capital expenditures that terrestrial build-outs require to connect small and dispersed communities in such remote locations. Regulatory approvals, such as environmental approvals and local rights of way issues associated with siting cable and fiber broadband infrastructure, compound this problem. Additionally, given higher latitudes, traditional satellites located high above the equator often cannot "see" all of Alaska's territory with comparable speeds and costs offered elsewhere in the Continental U.S.

SpaceX seeks to address the challenges of access by developing a next-generation satellite system that will apply innovative technologies to provide rapid broadband data rates and minimal latency. Initially, the SpaceX system will consist of 4,425 satellites operating in 83 orbital planes in orbits close to the Earth. This will include polar orbiting satellites designed specifically to serve high-latitude areas like Alaska. The SpaceX constellation is designed to provide a wide range of broadband and communications services for residential, commercial, institutional, governmental, and professional users worldwide. The goal of the system is to provide high-speed, low-latency broadband directly to end-users.

Our planned satellite constellation would remove the per-mile construction costs inherent in rural and remote broadband access solutions and bypass the complexity of expanding terrestrial broadband networks (for instance, digging trenches, environmental approvals, and property rights issues). By operating close to the earth, the system will replace typical speed and latency complaints from current-generation satellite broadband offerings with service speeds, latencies, and pricing equivalent to terrestrial and 5G wireless technologies available in urban centers.

By investing upfront in a large-scale global satellite constellation, the cost of reaching additional customers—even in the most remote areas of the world—becomes incremental. Because the system will bring global coverage, including high-latitude customers, the cost of reaching these areas becomes essentially the price of a consumer terminal.

Commercial space is further contributing to the deployment of such systems by driving down the high cost of launch. SpaceX, for example, has developed its Falcon 9 rocket to be highly reliable and affordable. We have further innovated to enable our rockets to be reusable by landing the first stage of rockets on land or at sea on ocean-going droneships, and then re-launching previously flown boosters. Reduced launch costs will enable the deployment of large satellite constellations that can then help Alaskans get connected to affordable, high-speed broadband internet.

Question 3. Is latency still an issue?

Answer. Current-generation satellite broadband services utilize geostationary (GEO) satellites that fly at altitudes of 35,000 km, resulting in higher latencies (typically around 250 milliseconds) as the broadband signals traverse to and from the satellite in space. By contrast, the SpaceX broadband system will operate in low Earth orbit (LEO), at altitudes ranging from 1,110 km to 1,325 km. This dramatically shorter distance allows for latencies between 25-35 milliseconds.