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The Emerging Space Environment: Operational, Technical, and Policy Challenges

Senate Committee on Commerce, Science & Transportation

Subcommittee on Aviation and Space

May 14, 2019

Thank you, Chairman Cruz, Ranking Member Sinema, and Members of the Subcommittee. I am very pleased to testify today alongside Administrator Bridenstine, Lt. Gen. Thompson, former NGA Director Cardillo and Ms. Melroy. We continue to work often with their organizations and other Executive Branch colleagues on space policy issues, including the mandates of Space Policy Directives 2 and 3.

Today's hearing will inevitably cross many functional and organizational lines. By now, anyone familiar with the space business has heard projections of a space economy between $1 and $3 trillion over the next two decades. At the Department of Commerce, we have been spending lots of time with the organizations — think tanks, research arms of large financial institutions, others — to understand the key drivers and impediments to that space economy. Whatever the number, at that size the space economy will have tremendous implications for our economic and national security. Meanwhile, as we are all likely to testify, the space environment is becoming more complex as many more nations recognize the strategic importance of space for their own reasons.

Within the Department, I oversee an office created over thirty years ago, when space commercialization was merely a vision. Today, entrepreneurs encouraged by Administration leadership, fast-moving technology, and enabling ecosystem of investment and space insurance are creating a diverse set of capabilities in the market. They are enabled by standardization, reusability, and continuous learning, and their products and services leverage blisteringly fast parallel developments in artificial intelligence and cloud computing.

So to set one of the contexts for today's discussion, one aspect of the future space operating environment is that it will be overwhelmingly commercial. Commercial firms will continue to seek the creation of wholly new services here on earth — just extending high-speed communications and internet access to areas not covered today takes the space economy to $1trillion by 2040 — while others seek to build the space infrastructure to take us to the Moon, Mars, and beyond. That infrastructure will include launch, habitation, and the scientific research required to pursue our exploration goals in as safe a manner as possible.

Every day at the Commerce Department, we see and often assist innovative companies that are trying to come to market or even ones that are already in the market. One company, for example, has the ability to create the atmosphere of the Moon or Mars here on earth in order to train future space workers on the environment they will work in. My friend and colleague of over 20 years, Mr. Cardillo and I have watched as satellite imagery processing has shifted from light tables to artificial intelligence, accelerating and deepening our knowledge of activities here on earth. The U.S. innovative spirit is alive and well.

The mandate of the Office of Space Commerce is to "foster the conditions for the economic growth and technological advancement of the U.S. commercial space industry". While we often work with firms to explain how to engage with the U.S. government or deal with

specific regulatory matters, one of the ways in which we promote our commercial space industry is to bring together industry groups to understand how the nexus of policy, regulation, and developments in supporting industries help drive or impede their progress.

Secretary Ross has hosted two space summits, for example, at the Department of Commerce, on space finance and insurance. The space technologies that present possibly the greatest potential, such as space resource development, lunar habitation, on-orbit assembly, and others, will require long-term capital investment. Our second summit looked at the insurance implications of improved space situational awareness as well as the role of space insurance in shifting risk. The Secretary and I were in New York City a few weeks ago for updates from those industries.

One of the issues we are starting to focus on is improving the role of the U.S. government agencies in the space economy. The U.S. government is still a very powerful actor in commercial space markets. And the business models are changing: we are seeing an important shift from the traditional "U.S. government buyer take all" approach to one where small, forward leaning investments in the market both stimulate demand and attract additional investment from diverse U.S. capital markets. This allows the U.S. government to leverage commercial markets and explore specific use cases while providing critical resources toward commercialization. In other words, U.S. government agencies should move beyond a "wait and see" mode and provide early, but limited support for commercial firms. At the recent National Space Symposium, Secretary Ross agreed that we would work with Administrator Bridenstine and his team at NASA on LEO commercialization strategies. One of the things that we have already done is to piggy-back on NASA's sponsorship of the annual "Space.com" symposium in Houston to add new discussion sessions on space commerce.

While we are following the macro-assessments of the future space economy, we are also trying to enrich our understanding of space-related activities at the state and local levels, in order to help drive government and commercial understanding of unique niches within the space economy. The Department's Economic Development Administration (EDA) and Minority Business Development Agency (MBDA) have grant-making authority related to regional economic development, including space commerce. Just last year, MBDA awarded a $400,000 grant to the Space Foundation to directly facilitate an introduction to the field of space commercialization in several communities throughout the country. The office has begun working with the Bureau of Economic Analysis in order to more fully understand the contribution of space to our national GDP.

Office of Space Commerce

The reconstitution of the National Space Council has been a foundational step in focusing our attention on the challenges and opportunities for U.S. commercial space, and its role in our larger space, economic and national security strategies. It has facilitated the alignment of space missions by creating efficiency across government by facilitating venues for interaction, debate, cooperation. The National Space Council's "whole of government" approach to space decision-making forces lively interaction on complex issues that has driven an unprecedented speed of government decision-making in these areas.

What is being pursued in parallel is the creation of greater efficiency within each of our organizations. The Administration has requested authority to transfer the Office of Space Commerce from NOAA to the Office of the Secretary. Three core ideas underpin the request for the Office of Space Commerce: as a signal of the importance of the U.S. commercial space industry to our nation's economic and national security future; as a way of leveraging the many

different Commerce bureaus and organizations to support U.S. space commerce; and as a way of ensuring that economic and commercial views have equal representation in high-level Executive Branch discussions.

Even as our discussions about the Office continue, the Department and the Office of Space Commerce are working every single day to advance U.S. commercial space interests. A large amount of our efforts have been driven, naturally, by Space Policy Directives 2 (Streamlining Commercial Space Regulations) and 3 (Space Traffic Management).

As just a few examples, we released our SPD-2 report with thirteen recommendations for the preservation of satellite spectrum; we submitted comments on the FCC NPRM and are leading an interagency effort to ensure that any new space debris regulations reflect the priorities of the Administration and our Executive Branch colleagues; we issued two public notices soliciting comments on policy and regulation regarding commercial space; and just this morning we released an NPRM on commercial remote sensing that took a "clean sheet" approach in an area moving along at rapid speed. We have issued an RFI on SSA/STM capabilities, and we are working with our sister agency NIST on a broad survey of existing technical space standards to inform best practices in order to encourage space safety and innovation.

The Executive Branch is working hard to encourage entrepreneurship and innovation. Agile regulatory and governance processes will be key to enabling the exciting developments that I discussed above and key to making sure that the United States remains "flag of choice" for space entrepreneurs. It will require continuing collaborative conversations across the organizational lines at this table and others, such as FAA and State.

Why is this so important? Historically, we argued about these issues in a vacuum. Today, however, we live in a world with competing international visions for the future of space and a hyper-competitive world. Collaboration will be essential between those countries who believe in innovation, genuine partnership, and free markets. You will have seen Secretary Ross's signing of a space cooperation agreement between the United States and Luxembourg last week as a reflection of that. Further, at the end of June, the Department of Commerce, with the Department of State, will co-host a third space summit to examine international space partnerships — across government and industry lines — to discuss the changing nature of cooperation and competition in space. I hope that some of you will be able to join us for those discussions.

Space Situational Awareness and Space Traffic Management

Let me highlight one other area of cross-government integration: SPD-3 and the need to improve space situational awareness (SSA) and space traffic management (STM).

The strategic space situation and the space congestion problem become more complex on a daily basis. As discussed before the Congress last year by General Hyten, Administrator Bridenstine, and Secretary Ross, the need to adjust organizational lines between the Department of Defense and the Department of Commerce becomes more urgent. Commerce has moved out, within existing authorities and resources, on SPD-3. As I mentioned earlier, this week, we expect responses to an RFI designed to canvass the landscape of companies, whether those who will help mitigate the space debris problem — with either new sensors or visualization tools or with cloud computing and machine learning capabilities, or those who by virtue of exciting new concepts like maneuverable "space tugs" or mega-constellations, will create wholly new demands for SSA/STM services.

Almost every one of the SPD-3 activities involve broad interagency coordination, but the Department of Defense, the USAF and the Department of Commerce have been in lockstep from the start. Remember that the logic of this partnership — designed to transition commercial conjunction analysis and notification to Commerce by 2024 — is to allow DoD to focus on the more pressing mission of ensuring a peaceful space environment, protecting critical U.S. space assets, and protecting and defending the United States and its allies. But it is also based on the need to harness the innovation of the private sector and modernize our approaches against this urgent problem.

The Department's efforts are focused in a number of areas, which I can highlight briefly. Within the next two months, DoD's Air Force Research Lab (AFRL) will deliver to Commerce a first "experimental" part of our planned open architecture data repository (OADR). This will complement already existing analytic, architectural, and data management efforts within organizations like NOAA and Census within the Department. The repository, which will continue to be based on DoD's authoritative catalogue, will incorporate commercial and allied commercial data and serve as the foundation upon which innovative commercial capabilities can support the growing market. Industry and academia will also play key roles in our efforts, as directed by SPD-3.

The nature of the space debris problem and the high-velocity nature of global space markets mean that we have to move fast, likely faster than the 2024 deadline. We will have to make effective speed, not reckless speed, given the consequences. We must strengthen our already strong interagency partnerships and enjoin the support of the Congress in order to develop a state-of-the-art capability, one that advances U.S. leadership and extends the tremendous partnerships we enjoy as a nation on SSA and STM.

Why is this so important? SSA and STM does not just effect on-orbit safety; it has huge economic effects that trickle down through the entire space ecosystem, affecting technology and business models, investment and insurance, and launch costs and schedules. In this regard, the future of space safety lies in a portfolio of activities from satellite design, to improved SSA, to changes in policy and regulation. It is essential that we prioritize this issue with proper resources across the board.

Conclusion

Mr. Chairman, Ranking Member Sinema, and members of the subcommittee, thank you for your interest today. As you will inevitably hear today, there are many operational, technical, and policy challenges to sustaining American leadership in space. As we continue to work together within the Executive Branch, and with the Congress, let's not forget the extraordinary role that the private sector can play in addressing those challenges. Growing commercial activity in space creates an economic foundation for our resiliency in space, as well as for those of our allies. This is an exciting time to be in the space business and there's a lot of work to be done here, in furtherance of American prosperity and American security. Thank you.