

# Operational and Policy Implications of Integrating Commercial Space Services into U.S. Department of Defense Operations

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# ISSUE

The U.S. Department of Defense (DoD) relies on a wide variety of space capabilities to carry out its critical missions. Although DoD has traditionally developed and operated its own satellite systems, its use of commercial space services has increased as the industry has expanded, and it is expected that DoD's use of these services will continue to grow. Despite the benefits these commercial services can bring, DoD must consider vulnerability of these commercial space services to adversary attack when determining how much to rely on them and what missions they should support.

Congressional interest in this topic led to a requirement, specified in the National Defense Authorization Act for Fiscal Year 2022, for a study that assesses "(1) the extent of commercial support of, and integration into, the space operations of the Armed Forces; and (2) measures to ensure that such operations, particularly operations that are mission critical, continue to be carried out in the most effective manner possible during a time of conflict."



## APPROACH

The Assistant Secretary of the Air Force for Space Acquisition and Integration asked RAND Project AIR FORCE to conduct an independent study to fulfill the congressional requirement and to cover ten topics detailed in the Senate's legislative proposal. Our key findings are organized according to these ten topics. The scope of this research was focused on how commercial space services or data derived from commercial space systems support U.S. armed forces operations. We explored six commercial space markets—satellite communications (SATCOM); space domain awareness (SDA); remote sensing; environmental monitoring; positioning, navigation, and timing; and space logistics—and focused on the first two to better address the sponsor's top priorities.

Our research synthesized information collected from varius sources, including relevant policy, literature, and other open-source information on the commercial space industry, and discussions with more than 70 government and industry subject-matter experts.



#### KEY FINDINGS

- **Current usage:** Commercial space services make considerable contributions to DoD missions. Commercial SATCOM is a significant contributor and a critical enabler to several high-value missions. Although their use varies, all military services use some level of commercial SATCOM in their daily operations. For SDA, DoD relies mostly on its own capabilities to support its missions, augmented by commercial capabilities. The U.S. Space Force and U.S. Space Command are the principal DoD users and providers of SDA services considered in this report. DoD use of commercial services is limited for the remaining space missions that we considered.
- Anticipated usage: The degree to which DoD will use commercial services in the future will depend, in part, on how much DoD signals its intentions for future use and projected future needs. Companies will use those demand signals to decide on future investments that will potentially expand capabilities of interest to DoD, thus increasing the use of these services. Our analyses suggest that DoD is likely to increase its use of commercial services in many markets, including many emerging markets as they mature.
- **Operational impact:** It is unlikely that DoD will lose access to all commercially operated space systems because of the inherent resilience of individual company services and DoD access to multiple, independent providers. This is true for both SATCOM and commercial SDA services. Should a loss of access occur, however, the impact will depend on the criticality of the mission and any contingency plans the user has in place, with possible outcomes ranging from degradation in the ability to execute the mission to a mission abort.
- **Mitigation measures:** DoD can mitigate the operational impact of losing commercial services by diversifying its space architectures, including government, international partner, and commercial space capabilities. DoD should consider the criticality of the missions and ensure that its mission architecture can support the minimum essential functions to enable continuity of operations when commercial services are not available. Additionally, DoD can mitigate the risk of losing commercial services by, for example, performing due diligence (such as examining physical and cybersecurity considerations) of individual companies prior to awarding contracts, providing timely threat information, conducting assessments of company viability, and considering countermeasures to possible foreign influence. The department can also diversify its service providers and rely on multiple technological approaches, proliferated commercial networks, and distributed basing.
- **Resiliency:** Commercial space services, if appropriately implemented, can significantly increase the resiliency of DoD space architectures. Commercial services improve many of the resiliency characteristics of DoD space architectures, including disaggregation, distribution, diversification, and proliferation. Commercial SATCOM is one of the key elements in DoD's hybrid SATCOM architecture to increase resiliency. Although we posit that the commercial SDA services leveraged by the Joint Task Force-Space Defense Commercial Operations increase the resiliency of the SDA enterprise, it is not clear to what extent DoD plans to leverage commercial SDA as an additional capability to increase its SDA mission resiliency.
- **Interference activities:** Intentional third-party interference with commercial services that support DoD operations has been limited over the past decade—a period in which the United States did not experience direct armed conflicts with a capable adversary. But in the Ukraine war, Russia has demonstrated its will and capability to interfere with commercial SATCOM services—a potential warning of what the United States should expect in a future conflict environment.
- **Governance:** The Outer Space Treaty regime represents the strongest set of hard law mechanisms that govern the behavior of commercial and government operators in space, but enforcement mechanisms are weak. Moreover, the Outer Space Treaty is dated, and international governing efforts today focus on developing and propagating norms of behavior that are voluntary. Another key set of regulations promulgated by the International Telecommunications Union coordinates and assigns frequencies for the global radio network and designates orbit slots for satellites in geosynchronous earth orbit.
- **Commercial as a military target:** The consensus among policy, legal, and military experts is that a commercial satellite supporting military operations is a legitimate military target under international law. However, questions remain about what constitutes a necessary and proportional military attack against a satellite and what types of attacks might be considered a violation by the international community.



#### **KEY FINDINGS-CONTINUED**

- Awareness: Commercial satellite operators supporting DoD are acutely aware that they face threats from U.S. adversaries and would like to have more access to threat information. There are different layers of threat warnings and notifications that range from near-real-time to longer-term general awareness to which commercial operators have various levels of access.
- **Insurance:** Most commercial satellite insurance policies exclude losses occurring from acts of war and cyberattacks, and the insurance industry views cyberattacks as a growing threat. Owners and operators of satellites that support military operations can obtain a variety of types of insurance to cover activities throughout the life cycle of a satellite. About 40 percent of satellites in geosynchronous earth orbit are insured compared with about 1 percent of satellites in low earth orbit.



### CONCLUSIONS

Commercial space services offer DoD an opportunity to meet its evolving mission requirements more responsively and increase resiliency of DoD's space architectures. As the department moves in the direction of increasing its use and integration of commercial space services and data, it must navigate many operational and policy considerations. Much work remains for DoD to operationalize integration of commercial space into its space architectures—even for commercial SATCOM, an area in which DoD has the most experience working with the commercial sector. And the reality that commercial satellites may be targeted by U.S. adversaries is further complicating the matter.

The policy arena needs to evolve and mature to guide and synchronize a wide variety of activities across multiple U.S. government and DoD components so that commercial space capabilities can be effectively used to meet national security objectives and to protect the vitality of the commercial space industry.



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