Statement before the House Armed Services

Subcommittee on Strategic Forces

"Near-Peer Advancements in Space and Nuclear Weapons."

A Testimony by:

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Chairman Cooper, Ranking Member Turner, and distinguished members of the Subcommittee, thank you for the opportunity to testify today. Space has traditionally been viewed by many as a domain of science, commerce, and exploration. While that continues to be true, it is also a warfighting domain. Since the beginning of the space age, satellites have provided important military capabilities, ranging from communications and weather forecasting to missile warning and reconnaissance. Once the military potential of space became apparent, nations started developing ways to deny others the military benefits of space. In 1959, just two years after the launch of *Sputnik*, the United States tested the first anti-satellite (ASAT) weapon—a Bold Orion missile launched from a B-47 bomber.[1] The Soviets soon followed suit, beginning tests of a space-based co-orbital ASAT weapon system in 1963 and declaring the system fully operational by 1973.[2]

There are some hard truths many in the space community and national security enterprise may find difficult to accept. Space was never really a sanctuary.[3] Space was militarized from the beginning. And if one considers a satellite that can attack other satellites a space weapon, then space has already been weaponized as well.[4]

In the United States, we often think about space as separate and distinct from nuclear forces and missile defense. But from our adversaries' perspective, they are intricately linked. Both Russia and China fear that advances in U.S. missile defense systems could one day undermine the credibility of their nuclear deterrent by reducing the chances that they could deliver an effective retaliatory strike. From their perspective, attacks against U.S. space systems are a way to disrupt our battle networks and, in a strategic conflict, are effectively a penetration aid for nuclear-armed ballistic missiles.[5]

With this in mind, the Russian and Chinese proposal at the United Nations to ban some types of space and counterspace weapons is not surprising. Their proposal would ban space-based weapons that could attack other satellites or targets on Earth, but it would not limit their terrestrially based counterspace weapons that hold many of our satellites at risk.[6]

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[1] Robert Bowman, *Star Wars: A Defense Insider's Case Against the Strategic Defense Initiative* (Los Angeles, CA: Teachers Publications, 1986), 14.
[2] Laura Grego, "A History of Anti-Satellite Programs," Union of Concerned Scientists, January 2012, 3, https://www.ucsusa.org/sites/default/files/2019-09/a-history-of-ASAT-programs_lo-res.pdf.
[3] Robin Dickey, *The Rise and Fall of Space Sanctuary in U.S. Policy* (Washington, DC: Aerospace Corporation, September 1, 2020), 5, https://aerospace.org/paper/rise-and-fall-space-sanctuary-us-policy.
[4] Todd Harrison, *International Perspectives on Space Weapons* (Washington, DC: CSIS, May 2020), 5, https://www.csis.org/analysis/international-perspectives-space-weapons.
[5] Kaitlyn Johnson, "A Balance of Instability: Effects of Direct-Ascent Anti-Satellite Weapons Ban on Nuclear Stability," Defense360, CSIS, October 21, 2020, 9–10, http://defense360.csis.org/wp-content/uploads/2020/10/2Kaitlyn_A-Balance-of-Instability.pdf.
[6] Harrison, *International Perspectives on Space Weapons*, 13-14.

The choice facing the United States today in space is not whether we should militarize or weaponize space—that has already happened. Our decision is how to respond to the threats we face in the space domain. As General Dickenson, the commander of United States Space Command, recently noted, "a day without space is not an option."[7]

In our annual CSIS Space Threat Assessment, we document publicly available information on the counterspace capabilities of other nations.[8] Counterspace weapons come in many forms, some of which are more visible and attributable in their effects than others. Perhaps the most visible and widely known example of a counterspace weapons test was the 2007 Chinese ASAT test, which destroyed one of China's own satellites and created thousands of pieces of space debris. What is less known is that China has continued testing its direct-ascent ASAT weapons at a pace of about once each year, although subsequent tests have been designed to avoid creating large amounts of space debris.

Russia has been testing similar direct-ascent ASAT weapons, with its most recent test in December 2020, and it has revived its co-orbital ASAT program. Last summer the Russian *Cosmos 2543* satellite maneuvered near another Russian satellite and fired what was believed to be a projectile.[9] This test is particularly noteworthy because Russia has publicly declared that it will not be the first nation to put weapons in space.[10]

While kinetic forms of attack such as these often receive the most attention, there are many other types of counterspace weapons being developed and proliferated by Russia, China, and others. For example, lasers can be used to temporarily dazzle or permanently blind the sensors on satellites, and high-powered microwave (HPM) weapons can disrupt a satellite's electronics or cause permanent damage to electrical circuits and processors in a satellite. These attacks operate at the speed of light and, in some cases, can be less visible to third-party observers and potentially more difficult to attribute. China has been working on a satellite lasing system since at least 2006 when it reportedly illuminated a U.S. government satellite flying over Chinese territory.[11] Similarly, Russia has deployed satellite lasing systems on aircraft and ground vehicles.[12]

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[7] "Never a Day without Space: Commander's Strategic Vision," United States Space Command, February 3, 2021, https://www.spacecom.mil/Portals/32/Images/cc-vision/usspacecom-strategic-narrative-2021.pdf?ver=QcJDDJDcjLDweADraPD0ew%3d%3d.
[8] Todd Harrison et al., *Space Threat Assessment 2020* (Washington, DC: CSIS, March 2020), https://aerospace.csis.org/wp-content/uploads/2020/03/Harrison_SpaceThreatAssessment20_WEB_FINAL-min.pdf.
[9] U.S. Space Command Public Affairs, "Russia tests direct-ascent anti-satellite missile." https://www.spacecom.mil/MEDIA/NEWS-ARTICLES/Article/2285098/russia-conducts-space-based-anti-satellite-weapons-test/.
[10] "Letter from the Permanent Representatives of the Bolivarian Republic of Venezuela and the Russian Federation to the Secretary-General of the Conference on Disarmament," United Nations, April 4, 2016.
[11] Andrea Shalal-Esa, "China Jamming Test Sparks U.S. Satellite Concerns," Reuters, October 5, 2006, as quoted in Yousaf Butt, "Effects of Chinese Laser Ranging on Imaging Satellites," *Science & Global Security* 17, no. 1 (2009): 20–35, http://scienceandglobalsecurity.org/archive/sgs17butt.pdf.
[12] Harrison et al., *Space Threat Assessment*, 24–25.

Both Russia and China have advanced satellite jamming and spoofing capabilities, as do nations like Iran and North Korea. China has been implicated or suspected in several cyberattacks against U.S. satellites, to include an attack against the ground station controlling the *Landsat-7* satellite in 2007 and an attack against NASA's *Terra* satellite in 2008.[13] In September 2014, Chinese hackers attacked the National Oceanographic and Atmospheric Administration's (NOAA) satellite information and weather systems, forcing NOAA to take down the system and stop transmitting satellite images to the National Weather Service for two days.[14]

The data is clear—both Russia and China pose serious threats to commercial, civil, and military space systems. But the lack of public discourse about how to defend against space threats may have led some to conclude that space is not defendable and should not be relied upon by the military.[15] The fact that space is contested does not mean that space is undefendable. Rather, it means that the United States will have to fight to protect its ability to operate in this domain, just as it does in the air, land, and maritime domains.

A wide array of defenses is available to improve the protection of space systems from counterspace weapons. These include passive defenses that make space systems more difficult to attack and active defenses that target the threats themselves. In a forthcoming CSIS report, we detail a broad range of these space defenses and make seven recommendations for investment priorities, actions, and additional analysis to improve U.S. space defense capabilities.

1. A priority should be placed on improving space domain awareness capabilities, to include more space-based sensors, better integration with commercial and friendly foreign government space surveillance networks, and the use of artificial intelligence to analyze data and form a better understanding of adversary capabilities and intentions.
2. Additional effort should be placed on developing improved indications and warnings for space that give decisionmakers more time and information to tailor defensive responses to the specific circumstances of a conflict.
3. New space architectures are needed that use a combination of distribution, proliferation, and diversification of orbits. These new architectures do not necessarily need to replace legacy architectures but rather should be used to supplement and diversify capabilities that already exist.

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[13] Sui-Lee Wee, "China Denies It Is behind Hacking of U.S. Satellites," Reuters, October 31, 2011; U.S.-China Economic and Security Review Commission, *2015 Report to Congress* (Washington, DC: 2015), 296, https://www.uscc.gov/sites/default/files/annual_reports/2015%20Annual%20Report%20to%20Congress.PDF.
[14] Office of the Inspector General, *Cybersecurity Management and Oversight at the Jet Propulsion Laboratory* (Washington, DC: NASA, 2019), 8–9, https://oig.nasa.gov/docs/IG-19-022.pdf.
[15] Paul Scharre, "The US Military Should Not Be Doubling Down on Space," Defense One, August 1, 2018, https://www.defenseone.com/ideas/2018/08/us-military-should-not-be-doubling-down-space/150194/?oref=d-river.

4. Non-kinetic active defenses, such as onboard jamming and lasing systems, are needed to thwart kinetic attacks against high-value satellites. A physical seizure capability should also be explored that could double as an inspector and on-orbit servicing satellite.
5. New options should be considered to improve DoD's integration with commercial space operators, such as creating a program like the Civil Reserve Air Fleet (CRAF) with commercial space companies.
6. A better understanding is needed of the operational, political, and strategic risks involved in the use of stealth, maneuver, rapid deployment, and reconstitution before committing significant resources to these areas.
7. Further analysis and gaming are needed to explore gray zone competition in space and how to respond to a reversible attack or the threat of attack.

Progress is being made in some but not all of these areas. Investments in space defenses are especially important now because the U.S. military is in the process of modernizing many of its key satellite constellations. The decisions made over the coming months and years about what types of space architectures to build and which defenses to incorporate will have repercussions for the life of these systems.