

August 2021

OCCASIONAL
PAPER

Volume 1, Number 8

Space as a Warfighting Domain: Reshaping Policy to Execute 21st Century Spacepower

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NATIONAL INSTITUTE FOR PUBLIC POLICY

**Space as a Warfighting Domain:
Reshaping Policy to Execute
21st Century Spacepower**

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National Institute Press®

Published by
National Institute Press®
9302 Lee Highway, Suite 750
Fairfax, Virginia 22031

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The author would like to express his appreciation to the Smith Richardson Foundation and the Sarah Scaife Foundation for the generous support that made this *Occasional Paper* possible.

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Executive Summary

Over the past decade, there has been a shift in opinion in the nation's governing and defense-planning circles about inter-state relations in space and the duties incumbent on those in positions of leadership to adapt and respond to the reality that space is a warfighting domain. Despite arguments put forth over the past several decades by sanctuary-policy proponents that space should remain free of Earth's conflicts, reality has dictated otherwise as other powerful nations have acquired the capabilities to execute offensive and defensive operations within the space domain. The United States has responded with recognition of the changed dynamic in its security policies and strategies by promoting greater awareness of the threat and reorganizing the Joint Force and command structure to protect U.S. space assets and mature U.S. spacepower. What steps will the nation take next to fulfill the U.S. Space Force mission to "defeat aggression and deliver space combat power"?

Two major changes have occurred that make it impossible to regard space as a sanctuary. The first is that space is increasingly recognized to be vital to the America way of life. Leaders in the Department of Defense have strained to make the point that losing access to space would be catastrophic. Second, other nations have deployed space assets and weaponry that may be used to deprive the United States of its freedom to use space. Possible answers to these threats would involve a more assertive military presence in the orbital regions in the form of improved space control capabilities and the application of force in space. These activities, however, remain problematic

*This Occasional Paper is based on Steve Lambakis, *Space as a Warfighting Domain: Reshaping Policy to Execute 21st Century Spacepower* (Fairfax, VA: National Institute Press, 2021), available at https://nipp.org/monographs_cpt/space-as-a-warfighting-domain-reshaping-policy-to-execute-21st-century-spacepower/.*

because they have not been properly authorized and adequate money has not been appropriated to develop weapon systems.

U.S. policy statements have consistently recognized space to be a free domain so long as activities of those who use space are peaceful and nonaggressive (although they may be military). Indeed, with the relatively forward-leaning ideas for countering threatening systems in space put forth during the 1970s, the United States began viewing space as an active warfighting domain, a position expanded upon by the Reagan Administration and its Strategic Defense Initiative. Moreover, the right to self-defense is internationally recognized in Article 51 of the United Nations Charter, a right that all nations within the UN recognize, which also extends into the space domain.

There have been a few key strategic-level developments since 2000 affecting the evolution of spacepower in the United States and its space policy discussions.

- With the nation's withdrawal from the Anti-Ballistic Missile (ABM) Treaty in 2002, the door was swung wide open for the possible development, deployment, and operation of missile defense architectures involving space-based sensors and weapons.
- With the growth in transparency in the defense space world since 2013, there has been a greater willingness among political and military leaders to talk about threats to space systems, counter-space systems used in actual demonstrations, and the nations developing them.
- This recognition of the threat to U.S. space systems drove the United States to take steps to consolidate the U.S. military space organization by establishing a U.S. Space Force and U.S. Space Command.

Developing military policies and programs with regard to space is complicated to some extent by a broad range of existing space laws and policies. There are various prohibitions and restrictions strewn among different treaties and conventions, and there are familiar domestic policy controversies (reflected in political arguments) about placing constraints on and funding of military space programs. In general, political reasons, not space laws, have been the difference-maker when it comes to sanctioned U.S. activities in space.

The United States is one of the few countries that can reach out to any corner of the world to deter an adversary, pursue a military objective, or defend its interests, and space is a critical enabler of this capability. Its deterrent must be extended across all of the domains – land, sea, air, space, and cyberspace. There are also missions that will require space dominance, including missile defense, which must leverage space to deploy sensors and, potentially, weapons. At its core, the United States seeks a secure, stable, and accessible space domain, which means the Joint Force must also be ready to establish, maintain, and preserve freedom of operations in space and protect and defend U.S., allied, partner, and commercial space capabilities.

Space control, or ensuring freedom of action in space, and force application (*the use* of active kinetic and non-kinetic space denial capabilities and defensive capabilities) in space are two space missions that are inadequately addressed in current policies. Passive defenses will not always be sufficient to protect satellite functions, and the employment of active defenses, or defensive force application, may be necessary.

Deterrence of attacks on space systems presents special challenges, to include the ability to identify who did what to whom and respond in a timely manner. The current U.S. approach to deterrence of attacks in space is to deny the

adversary victory by reducing the likelihood of success. Yet deterrence by denial might not be sufficient against an aggressive and determined adversary. A more comprehensive deterrence strategy—specifically the combination of denial and punitive approaches, coupled with the deployment of offensive retaliatory capabilities (potentially in space)—may be required to convince an adversary that the costs of initiating an attack would outweigh the benefits and that the likelihood of success would be low.

Thinking, in any case, must change. On the one hand, we speak in full recognition of space as a domain available for tactical military exploitation. Yet on the other, in what we do and what we *really* think, space is treated as a haven from hostilities. If the subjects of space control and space force application continue to be avoided or held in private classified sessions, there is not much that can be done to advance the agenda politically and ensure the required protection of U.S. interests through the exercise of spacepower. For space policy to be fully sanctioned by the nation and by the people, supportive actions by the nation's leadership and across the government are required, to include better public education and improved declassification procedures.

The reality of possible conflict in space almost certainly will bring significant headaches in international diplomacy. Deterrence and warfighting practices and theories of stability will have to be reexamined. New and more vicious budget wars will arise. Political leaders may not want to confront the problems that necessarily result from the maturation of spacepower. Yet the national vision for space centered on the freedom of space idea, and the country's national security space policy, must fold in the reality of possible combat engagements in space. If we are to ensure space dominance, the U.S. administration and the nation's lawmakers will have to take some policy risks in a time

when near-peer competition in space is growing rapidly and significantly. Inaction, inadequate action, or misguided action will have negative and degrading effects and place at risk the nation's ability to enforce its deterrence strategy and effectively fight a battle that may involve space warfare.

Although it has not yet issued its own national space policy, early signals by the Biden Administration indicate that it will take a realistic view of the threats to and in space. The Biden Administration should continue to support the establishment and evolution of the U.S. Space Force and the excellent work of the National Space Council, and undertake its own whole-of-government evaluation of existing National Security Space Policy and Defense Space Strategy to ensure they reflect 21st century space realities. It should then use the opportunity of a newly published directive to publicize broadly the U.S. vision for space, a vision that speaks clearly and unambiguously to the U.S. interest in maintaining freedom of space in times of peace and war. Unless power and will exist, the declarations made in any policy statement are ultimately meaningless and powerless. Spacepower maturation requires the administration and the U.S. Congress to ensure its relevance in defense policy discussions.

Chapter 1

National Security Space Policy in Transition

The argument over whether space is a warfighting domain or a sanctuary is over. To be sure, there are people who disagree that a sanctuary is no longer possible and, given the opportunity, would work to reverse or slow the policy movement toward adopting a warfighting posture in space. Yet changes have occurred that are irrevocably transforming how we and others must view the space domain, to include recent Chinese and Russian technological and military doctrinal developments.

Over the past few decades, sanctuary-policy proponents recognized that space was increasingly likely to be a warfighting zone and worked hard to make the case that space should remain free of Earth's conflicts. Yet reality has dictated otherwise; other nations have acquired the abilities to use space for warfighting. In recognition of this reality, the United States established the geographic warfighting command, U.S. Space Command, and declared space to be a warfighting domain.¹

¹ White House, "Fact Sheet: President Donald Trump is Establishing America's Space Force," February 19, 2019, available at <https://www.whitehouse.gov/briefings-statements/president-trump-establishing-americas-space-force/>; White House, "Fact Sheet: President J. Donald Trump is Unveiling an America First National Space Strategy," March 23, 2018, available at <https://www.whitehouse.gov/briefings-statements/president-donald-j-trump-unveiling-america-first-national-space-strategy/>; White House, "Remarks by Vice President Pence on the Future of the U.S. Military in Space," August 9, 2018, available at <https://www.whitehouse.gov/briefings-statements/remarks-vice-president-pence-future-u-s-military-space/>; 2018 *National Strategy for Space*, March 23, 2018; Jim Garamone, "Space Force Flag Unveiled at White House," *DoD News*, available at <https://www.defense.gov/Explore/News/Article/Article/2189023/space-force-flag-unveiled-at-white-house/>; Department of Defense,

In 2017, U.S. *National Security Strategy* (NSS) outlined a vision for space acknowledging that Earth's orbits comprise a warfighting arena. This view was also shared by the majority of the Legislative Branch, which supported the decision to establish a Title 10 entity, a sixth military service, the U.S. Space Force.² The vision reflects a decidedly realist understanding of the way states behave.

Throughout the space age the United States has affirmed, in one form or another, that "any harmful interference with or attack upon critical components of our space architecture that directly affects this vital interest will be met with a deliberate response at a time, place, manner, and domain of our choosing."³ Access to and freedom to

Defense Space Strategy Summary, June 2020, p. 1, available at https://media.defense.gov/2020/Jun/17/2002317391/-1/-1/1/2020_DEFENSE_SPACE_STRATEGY_SUMMARY.PDF; Stephen Kitay, DASD (Space), "Defense Official Briefs Defense Space Strategy to Reporters," June 17, 2020, transcript available at <https://www.defense.gov/Newsroom/Transcripts/Transcript/Article/2225281/defense-official-briefs-defense-space-strategy-to-reporters/>.

² Joe Gould, "Congress adopts defense bill that creates Space Force," *Defense News*, December 17, 2017, available at <https://www.defensenews.com/congress/2019/12/17/congress-adopts-defense-bill-that-creates-space-force/>; See also Kitay, "Defense Official Briefs Defense Space Strategy to Reporters"; Gen. John W. Raymond, "How We're Building a 21st-Century Space Force," *Atlantic Online*, December 20, 2020, available at <https://www.theatlantic.com/ideas/archive/2020/12/building-21st-century-space-force/617434/>. General Raymond is the nation's first Chief of Space Operations.

³ White House, *National Security Strategy of the United States of America*, December 2017, p. 8, available at <https://trumpwhitehouse.archives.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf>. White House, "Remarks by President Trump and Vice President Pence Announcing the Missile Defense Review, January 17, 2019, available at <https://www.whitehouse.gov/briefings-statements/remarks-president-trump-vice-president-pence-announcing-missile-defense-review/>

maneuver in space is a vital national interest, elevating defense of U.S. space assets to a high-priority mission. Although these policy constructs and tenets existed for years, recent events spurred the United States to become better prepared to treat space as a place for combat.⁴

It is entirely natural for any state, especially one with a strong national security and economic dependence on space, to develop the defensive and offensive spacepower capabilities required to protect its interests and, as needed, assert its will on the edge of Earth. Today, vital space networks make it possible for communications, positioning, navigation and timing, and surveillance and reconnaissance satellites to provide critical force enhancement capabilities to U.S. and allied warfighters. Space-reliant national security activities and functions include the execution of combat operations, command and control of forces and critical nuclear and missile defense systems, missile launch detection, kill assessment following missile defense engagements, targeting and offensive operations, and logistics and humanitarian support.⁵ Society at-large depends on space systems for trade and commerce, banking, other financial transactions, food production and distribution, communications, transportation, power and

⁴ Transcript, "Media Roundtable with U.S. Space Command Commander Gen. John Raymond," *Defense.gov*, August 29, 2019, available at <https://www.defense.gov/Newsroom/Transcripts/Transcript/Article/1949346/media-roundtable-with-us-space-command-commander-gen-john-raymond/>.

⁵ Joseph Nimmich, *Written testimony for a Joint House Armed Services, Subcommittee on Strategic Forces; and, House Homeland Security, Subcommittee on Emergency Preparedness, Response and Communications*, hearing titled "Threats to Space Assets and Implications for Homeland Security," March 29, 2017, available at <https://armedservices.house.gov/legislation/hearings/threats-space-assets-and-implications-homeland-security>.

water infrastructure, and weather monitoring and assessment.⁶

While many methods for countering enemy satellites and protecting U.S. satellites, that is, space control, are classified, we can assume each of the military services uses other tactics to protect U.S. space systems from foreign interference (e.g., satellite avoidance operations and technical camouflage measures). We also know that the armed services have available active measures, such as radio-frequency jamming and cyber warfare, to disrupt threatening foreign satellite operations.⁷

Noticeably absent in the list of U.S. offensive and defensive capabilities, as far as we know at the unclassified level, are terrestrial- or space-based systems to actively protect U.S. satellites from direct attack by enemy kinetic or directed energy weapons, or to forcefully and permanently remove hostile satellites from orbit. Also absent are weapons that may be deployed in space to defend the nation, for example, against ballistic or hypersonic missile attack, or project force directly to a location on Earth. The main point is that today, military activities in space are severely restricted to the use of space as a channel for passing or collecting data. What policies and steps will the nation take now to fulfill the mission to “defeat aggression and deliver space combat power”?⁸

⁶ National Academies of Sciences, Engineering, and Medicine, *National Security Space Defense and Protection: Public Report* (Washington, DC: The National Academies Press, 2016), p. 2, available at <https://www.nap.edu/catalog/23594/national-security-space-defense-and-protection-public-report>.

⁷ Steve Lambakis, *Foreign Space Capabilities: Implications for National Security* (Fairfax, VA: National Institute Press, 2017), pp. 49-53.

⁸ According to the FY 2020 National Defense Authorization Act (NDAA) authorizing the Space Force, the Space Force shall be organized, trained and equipped to provide: 1) freedom of operation for the United States in, from, and to space; and 2) prompt and sustained space operations. Among the duties of the Space Force are: 1) protect

The absence of policy, supporting rhetoric, and authorized and budgeted programming has put the country behind the curve when it comes to fielding relevant military space capabilities and developing appropriate doctrines. Although the United States, with bi-partisan support from Congress, adopted the view that space is a warfighting environment, much remains to be done. U.S. dependence on space continues to grow. Simultaneously, the capabilities of other nations to threaten U.S. space assets are increasing, as are their abilities to use space for warfighting.

Thus, even though reality dictates that space is now a warfighting arena, policy uncertainty about which U.S. activities in space are permissible remains. Yet, pressure to bolster space deterrence and prepare for the defense of U.S. interests there is growing. This is due, in part, to the fact that other nations do not have the same policy uncertainties or self-restraint regarding technology initiatives. It is imperative that the United States remedy the space policy deficit, clarify objectives, and identify technology choices.⁹

the interests of the United States in space; 2) deter aggression in, from, and to space; and 3) conduct space operations. See Thompson Hine, "FY 2020 NDAA Signed into Law with U.S. Space Force, Cyber Operations & Acquisition, *thompsonhine.com*, December 26, 2019, available at <https://www.thompsonhine.com/publications/fy-2020-ndaa-signed-into-law-with-us-space-force-cyber-operations-acquisition-reforms>.

⁹ This work is a follow-on to the author's 2001 book, Steven Lambakis, *On the Edge of Earth: The Future of American Space Power* (Lexington, KY: The University Press of Kentucky, 2001).

Chapter 2

Key Changes Influencing Spacepower Requirements

Two major changes have occurred that make it impossible to regard space as a sanctuary and impel us to define it as a warfighting domain. The first is that space has become vital to our way of life; losing access to it and what it provides would be catastrophic. Second, other nations have developed capabilities and weaponry, the aims of which include depriving the country of its freedom to use space.

Dependency on Space

The growth in space activities by the United States and other nations, spurred on by continual technological developments, has made everyday life inextricably dependent on space. U.S. national security depends heavily on space assets for the operation of strategic and tactical weaponry.¹⁰ For the future, this dependence on space will grow.

These developments have spurred yet another phenomenon that was already underway—the increased use of space by more and more nations and companies. Going to space is getting easier. The U.S. private sector has reduced launch costs and made space technologies more feasible and affordable, and this trend is likely to continue.¹¹

¹⁰ Gina Harkins, “Space Wars: Why Top Military Leaders Say U.S. Must Prep for Battles Beyond Earth,” *Military.com*, August 24, 2020, available at <https://www.military.com/daily-news/2020/08/24/space-wars-why-top-military-leaders-say-us-must-prep-battles-beyond-earth.html>.

¹¹ Defense Intelligence Agency, *Challenges to Security in Space* (Washington, DC: Defense Intelligence Agency, January 2019), available at <http://www.dia.mil/Portals/27/Documents/News/Military%20Power>

The costs and technological challenges associated with developing space capabilities have declined to such an extent that several nations are now striving aggressively to exploit the space environment to further their national interests, creating positive opportunities for commercial and military operations.¹²

The proliferation of space technologies, of course, offers foreign governments and non-state entities unparalleled opportunities to enhance diplomatic influence (giving them “eyes” to see otherwise unknown events in a remote part of the world) and potential military effectiveness over the United States.¹³ Potential enemies of the United States today have improved vision over the U.S. homeland and battlefield activities, a better sense of direction and geographic position, greatly improved long-range precision strike weapons that utilize GPS-like guidance, and an improved ability to communicate, mobilize forces, and coordinate military activities.

Elevated Threat Risk to U.S. Space Systems

Over the past two decades, multiple threats have emerged to U.S. space systems. China and Russia have made strategic choices to develop their spacepower capabilities, to include conducting live anti-satellite tests in space and building capabilities that can damage or destroy U.S. space assets. According to former Secretary of Defense, Mark

r%20Publications/Space_Threat_V14_0 20119_sm.pdf. See also Sandra Erwin, “Space Force technology roadmap to emphasize partnerships with private sector,” *Space News Online*, August 19, 2020, available at <https://spacenews.com/space-force-technology-roadmap-to-emphasize-role-of-private-sector/>.

¹² See Theresa Hitchens, “Space Force Will Boost Reliance On Commercial Sats: Gen. Raymond,” *BreakingDefense.com*, December 2, 2020.

¹³ Harkins, “Space Wars.”

Esper, "China and Russia are weaponizing space through the development of anti-satellite missiles, directed energy weapons and more, all designed to hold the United States and allied space systems at risk. They have turned a once peaceful arena into a warfighting domain."¹⁴

Space access and space denial are critical components of Chinese and Russian national and military strategies.¹⁵ Both China and Russia perceive space systems as viable targets to nullify U.S. asymmetric advantages in other domains and gain a strategic foothold for future competition or counter a possible U.S. intervention during a regional military conflict.¹⁶

China has a robust network of space surveillance sensors capable of searching, tracking, and characterizing satellites in all Earth orbits. It is also developing electronic warfare, cyberthreat capabilities, sophisticated on-orbit

¹⁴ Dr. Mark T. Esper, Remarks at USSPACECOM Change of Command, August 20, 2020. See also Bill Gertz, "Second defector's knowledge of Chinese bioweapons reaches U.S.: Esper on Space Threats," *Washington Times Online*, September 16, 2020." Available at <https://www.washingtontimes.com/news/2020/sep/16/second-china-defector-gives-biological-weapons-inf/>. See also DoD, *Defense Space Strategy Summary*, p. 1, and Gen. John W. "Jay" Raymond, "Space dominance requires taking technology and policy risks," *Defense News Online*, September 14, 2020, available at <https://www.defensenews.com/opinion/commentary/2020/09/14/space-dominance-requires-taking-technology-and-policy-risks/>.

¹⁵ Gerald F. Seib, "Gen. Mark Milley: The Biggest Security Challenges for the U.S. The Chairman of the Joint Chiefs of Staff talks about the risks posed by China and Russia," *Wall Street Journal Online*, December 13, 2020.

¹⁶ DoD, *Defense Space Strategy Summary*, p. 3. Defense Intelligence Agency, *Challenges to Security in Space*, 2019, p. 14, available at http://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space_Threat_V14_020119_sm.pdf. See also Patrick M. Shanahan and Joseph F. Dunford, "Statement of Acting Secretary of Defense Patrick M. Shanahan & Chairman of the Joint Chiefs General Joseph F. Dunford before the Senate Armed Services Committee," April 11, 2019. Kitay, "Defense Official Briefs Defense Space Strategy."

capabilities, kinetic energy weapons (such as ground-based anti-satellite weapons), and possibly directed energy weapons in addition to other counterspace technologies.¹⁷ China also has an unmanned, reusable space plane program.¹⁸

China began its ASAT tests in 2005 and in 2007 destroyed a satellite in orbit that created significant space debris in low Earth orbit. Since then, it has conducted more than a dozen additional tests, including some in higher orbit, demonstrating the possibility of placing most U.S. satellites at risk. It has fired lasers at satellites and has five military bases capable of firing light to blind or destroy satellite optics. It also has incorporated cyberattack plans.¹⁹

For the past three years, China has fired more rockets into space than any other country and has had the most aggressive programs for other military and scientific efforts in space.²⁰ As it develops the capability to destroy the U.S. Global Positioning System, it has constructed for itself a super-secure network of satellites and controllers for global communications, in addition to a 35-satellite highly precise

¹⁷ Defense Intelligence Agency, *Challenges to Security in Space*, pp. 20, 21.

¹⁸ Trefor Moss, "Both the U.S. and China have secretive programs to develop unmanned, reusable spaceplanes," *Wall Street Journal Online*, September 4, 2020, available at <https://www.wsj.com/articles/china-launches-experimental-spaceplane-11599217896>.

¹⁹ For a summary of the growing China space threat to U.S. systems, see Lambakis, *Foreign Space Capabilities*, p. 19-26, and; Lambakis, *A Guide to Thinking About Space Deterrence and China*, (Fairfax, VA: National Institute Press, 2019), pp. 11-22, and Sandra Erwin, "Raymond on China's space program: 'It's alive, well and concerning,'" *SpaceNews Online*, December 17, 2020, available at <https://spacenews.com/raymond-on-chinas-space-program-its-alive-well-and-concerning/>.

²⁰ William Broad, "How Space Became the Next 'Great Power' Contest Between the U.S. and China," *New York Times*, January 24, 2021, available at <https://www.nytimes.com/2021/01/24/us/politics/trump-biden-pentagon-space-missiles-satellite.html>.

navigation system. Despite the fact that China officially advocates for the peaceful use of space and pursues agreements on the non-weaponization of space, Beijing continues to improve its counterspace weapons capabilities and ability to fight wars in and through space.²¹

As part of its modernization efforts, Russia is expanding its space capability by investing significantly in a full range of capabilities, to include ASAT kinetic weapons, lasers, jammers, and cyber weapons.²² Early in 2020, the commander of U.S. Space Command commander, General Jay Raymond, highlighted the concerning behavior of two new Russian satellites with distinct similarities to other Russian satellites that launched a high-speed projectile in 2017.²³ Russia continued its ASAT development activities in 2019 and 2020.²⁴

²¹ DIA, *Challenges*, p. 13. See also Office of the Secretary of Defense, *Military and Security Developments Involving the Peoples Republic of China 2020: Annual Report to Congress* (Washington, DC: Department of Defense, August 2020), pp. viii, 63-65. See also Brian G. Chow and Henry Sokolski, "U.S. satellites increasingly vulnerable to China's ground-based lasers," *SpaceNews Online*, July 10, 2020, available at <https://spacenews.com/op-ed-u-s-satellites-increasingly-vulnerable-to-chinas-ground-based-lasers/>.

²² James Clapper, *Worldwide Threat Assessment of the US Intelligence Community* (Washington, D.C.: Director of National Intelligence, February 9, 2016), available at https://www.armed-services.senate.gov/imo/media/doc/Clapper_02-09-16.pdf. For a look at how Russia is demonstrating increasingly advanced orbital maneuvering capabilities, see Pavel Luzin, "Cosmos ASATs and Russia's Approach to Space Weapons," *Eurasia Daily Monitor* Vol. 17, Iss. 121, August 14, 2020. Russia has demonstrated two different types of space weapons. See Greg Norman, "Russia tests anti-satellite missile in pursuit to make space a 'warfighting domain,' US officials say," *Fox News*, December 16, 2020, available at <https://www.foxnews.com/world/us-space-command-russia-tests-anti-satellite-missile>.

²³ Kitay "Defense Official Briefs Defense Space Strategy," June 17, 2020.

²⁴ Sandra Erwin, "Space Force official: Russian missile tests expose vulnerability of low-orbiting satellites," *SpaceNews Online*, December 16,

Another aspect of the threat profile is the U.S. reliance on cyberspace and the electromagnetic spectrum. China, Russia, North Korea and Iran are honing their cyber assault skills and putting them into practice.²⁵ A cyberattack on space systems can result in data loss, widespread disruptions, and even permanent loss of a satellite and system shutdown. Denial of service or loss of system performance can mean denial or loss of capability, which means such attacks have the same impact as a kinetic assault on defense and economic assets that rely on digital systems.

Space systems, which are part of the information network that relies entirely on digital systems and data flow and on software and radio-frequency links, are especially vulnerable to electromagnetic pulse (EMP) attacks. An EMP might create havoc not only on Earth, but also within satellite systems. The United States has a variety of systems, including Nuclear Command and Control and missile warning capabilities, whose survival, despite significant technical survivability enhancements, might be challenged by a nuclear detonation in space.²⁶ The threat of a cyber-attack on U.S. space assets is being viewed as the likely form of attack, at least in the near term.²⁷

2020, available at <https://spacenews.com/space-force-official-russian-missile-tests-expose-vulnerability-of-low-orbiting-satellites/>.

²⁵ See Steve Ranger, "US intelligence: 30 countries building cyber attack capabilities," *ZDNet*, January 5, 2017, available at <http://www.zdnet.com/article/us-intelligence-30-countries-building-cyber-attack-capabilities/>.

²⁶ See Kitay, "Defense Official Briefs Defense Space Strategy."

²⁷ See Theresa Hitchens, "Cyber Attack Most Likely Space Threat - Maj. Gen. Whiting," *BreakingDefense.com*, September 16, 2020, available at <https://breakingdefense.com/2020/09/cyber-attack-most-likely-space-threat-maj-gen-whiting/>.

Chapter 3

Current State of National Security Space Policy

This chapter offers a brief summary of current national security space policy and a look at the primary prescriptions and restrictions on military space activities. It also examines developments since 2000.

Policy Consistency from 1958 to Today

National security space policy has been remarkably consistent since President Eisenhower declared it was in the interest of the United States to ensure freedom of space, which, from the earliest days, included military uses of space and the goal of ensuring peaceful and scientific uses of space.²⁸ Every administration since Eisenhower's has recognized the vital importance to U.S. national security of freedom of action in space and the right to defend national space assets.

The right to self-defense is internationally recognized in Article 51 of the United Nations Charter, a right that all nations within the UN recognize; this article also extends into the space domain because there are no geographic limitations to the right to self-defense. From the earliest days of the space age, U.S. leaders recognized that space was freely available for exploration and use by all, but also

²⁸ A review of space policy history and the origins of the freedom of space principle can be found in Lambakis, *On the Edge of Earth*, pp. 211-235. White House Memorandum, "Discussion at the 339th Meeting of the National Security Council, Thursday, October 10, 1957," available at <https://www.eisenhowerlibrary.gov/sites/default/files/research/online-documents/sputnik/10-11-57.pdf>.

that nations could do other nations harm from and in space.²⁹

Presidents Gerald Ford and Jimmy Carter laid the foundation for the idea that space is more than a domain for enhancing land, sea, and air power, which set the stage for considering the development of anti-satellite weapons to counter threatening systems under development by the Soviet Union.³⁰ In other words, the United States began viewing space as an active warfighting domain in the 1970s, a position expanded on by the Reagan Administration, which sought to eliminate the threat of nuclear ballistic missile attack against the United States through the deployment of missile defenses in space. The George H. W. Bush Administration sought to develop “Brilliant Pebbles,” a space-based interceptor system, as part of the Global Protection Against Limited Strikes architecture.

Policies since 1958 also distinguished among military, civil, and commercial space activities, and they recognized an international dimension. From the beginning, the United States encouraged international cooperation, underscoring that commercial and national involvement with other nations would benefit the United States. The United States also has been cautiously open to undertaking measures with other nations to govern activities in space, as long as

²⁹ See White House, *National Space Policy of the United States of America*, December 9, 2020, p.1, available at *National-Space-Policy.pdf (whitehouse.gov).

³⁰ The 1976 NSDM-333 sought to enhance satellite survivability, available at <https://fas.org/irp/offdocs/nsdm-ford/nsdm-333.pdf>; and NSDM-345, issued in January 1977 toward the end of the Ford Administration, focused on development of the first non-nuclear ASAT, laying the groundwork for the first non-nuclear ASAT test using an F-15 in 1985, available at <https://fas.org/irp/offdocs/nsdm-ford/nsdm-345.pdf>. “1e. The United States will pursue Activities in space in support of its right of self-defense.” See Presidential Directive/NSC-37, “National Space Policy,” May 11, 1978, available at <https://www.hq.nasa.gov/office/pao/History/nsc-37.html>

the international agreements reached are equitable, verifiable, and enhance the security of the nation and its allies.

Key Developments Since 2000

There have been a few key strategic-level developments since 2000, in addition to those discussed in Chapter 2, affecting the evolution of spacepower in the United States and U.S. space policy discussions.

Withdrawal from the ABM Treaty. The United States made its first significant policy change in missile defense when President George W. Bush became president in 2001.³¹ Bush was strongly committed to fielding a homeland ballistic missile defense system against limited strategic threats, and the Defense Department undertook a thorough review of the missile defense program unconstrained by the Anti-Ballistic Missile (ABM) Treaty.³² The president's guidance was to field an effective, evolutionary missile defense system in the shortest amount of time. Of course, critical to the success of the missile defense program was the President's decision to withdraw the United States from the ABM Treaty, which occurred in June 2002.

Since the ABM Treaty withdrawal, the United States has deployed weapon systems and sensors to improve its ability to operate effective missile defenses and, given the policy direction to do so, it could deploy active space defense

³¹ The Bush missile defense policy was built on the institutional and policy foundations laid by President Reagan in his March 23, 1983 address to the nation introducing his bold and revolutionary approach to missile defense development called the Strategic Defense Initiative.

³² George W. Bush included homeland ballistic missile defense system development and deployment in his presidential campaign platform. The ABM Treaty limited both countries to two missile defense sites, each one having no more than 100 interceptor launchers. The 1974 protocol reduced the number of sites for each treaty signatory to one.

systems. The Bush program of record did not push for operationally relevant space sensors or space-based weapons for missile defense, although the United States did continue to launch payloads into orbit to demonstrate space sensor technologies and collect data that could be useful in the possible development of military space systems.

National Security Space Transparency. The public must have an understanding of the importance of space operations to national security and a basic conceptual understanding of space missions. Policy makers need to examine the wisdom of keeping so many of the country's space activities in the highly-classified world, because funding may well depend on the quality of the public argument and justification.³³ The Chinese space threat events of 2013 and 2014 shook the U.S. defense establishment to its core and caused it to reevaluate the secrecy surrounding the national security space program.³⁴

Today, Defense Department officials hold media roundtables to educate reporters and the public about the dangers of space threats and the actions taken by the United States in response. The U.S. intelligence community and defense officials are also publishing more details that help paint a picture depicting space as a warfighting environment.³⁵ Secrecy is still required, however, as even the DSS does not go into detail about weapons and how the strategy will be implemented. The growth in transparency in the defense space world since 2013 has been unprecedented, from transparency on the new U.S. space

³³ Lambakis, *On the Edge of Earth*, pp. 292, 296, and pp. 283-285.

³⁴ Lambakis, *Foreign Space Capabilities*, pp. 80-81.

³⁵ See, for example, statement by Gen. John Raymond: "The scope, scale and complexity of the threat to our space capabilities is real and it's concerning. We no longer have the luxury of operating in a peaceful, benign domain, and we no longer have the luxury of treating space superiority as a given." In transcript, "Media Roundtable with U.S. Space Command Commander."

organization to U.S. space activities and allied partnerships dedicated to deterring and defeating the threat. Public understanding of their reliance on space systems and space threats, nevertheless, remains cursory.³⁶

U.S. Organizational Changes. The changes in the security environment since 2013 and 2014 altered the calculus for the use of space. As noted above, this “counter-space awakening” led by military voices was a response to Chinese and Russian anti-satellite activities and a transformation taking place in the public eye, rather than behind the traditional closed doors of the defense space community. This was done in part, no doubt, to serve as a warning (or deterrent) to other countries that might seek to interfere with U.S. space systems.³⁷

The United States took steps to consolidate U.S. space efforts in three parts: a U.S. Space Force, a U.S. Space Command, and the Space Development Agency (SDA).³⁸ The Space Force, established in 2019, is now

³⁶ DoD, *Defense Space Strategy Summary*, p. 4. See also Transcript, “Media Roundtable with U.S. Space Command Commander.” See also Dennis Blair and Robert Work, “Stovepipes in space: How the U.S. can overcome bureaucracy to improve capabilities,” *Defense News Online*, July 13, 2020, available at <https://www.defensenews.com/opinion/commentary/2020/07/13/stovepipes-in-space-how-the-us-can-overcome-bureaucracy-to-improve-capabilities/>.

³⁷ Brian Weeden, *Through a Glass, Darkly: Chinese, American, and Russian Anti-satellite Testing in Space*, (Broomfield, CO: Secure World Foundation, March 17, 2014), pp. 1-19, available at https://swfound.org/media/167224/through_a_glass_darkly_march2014.pdf. See also Gen. John E. Hyten, *Hearing on the Nomination of General John Hyten to be Commander of U.S. Strategic Command*, 114th U.S. Congress, Senate Armed Services Committee, September 20, 2016, p. 20, available at https://www.armed-services.senate.gov/imo/media/doc/16-70_9-20-16.pdf.

³⁸ Department of Defense, *Final Report on Organizational and Management Structure for the National Security Space Components of the Department of Defense* (Washington, DC: Department of Defense, August 9, 2018).

organizing, training and equipping the military force, and providing a dedicated military leadership to unify, focus, and accelerate the development of space doctrine, capabilities, and expertise. U.S. Space Command, a geographic command that has a joint operational area beginning at 100km altitude, will make space support to the warfighter the sole focus of the commander.³⁹ SDA and follow-on acquisition organizations will help lead the development and deployment of a defense space architecture that is resilient and responsive to the threat and U.S. security needs in space.

Recent Changes in Visions

The 2006 National Space Policy of George W. Bush, the 2010 Barack Obama National Space Policy, and the Trump policy and strategy share much in common with previous space policies. Yet there were changes in priority and in tone, particularly between the 2006 and 2010 space policies.⁴⁰ At the highest level, the Obama Administration downplayed the relationship between warfighting and space. Whereas the relationship of national power to space were front and center in the Bush policy – as they are in the current space policy, the Obama policy shifted focus to the benefits of space to civilian uses and science.

³⁹ Sandra Erwin, "Raymond: Space Force has a plan to unify acquisition agencies," *SpaceNews Online*, October 22, 2020, available at <https://spacenews.com/raymond-space-force-has-a-plan-to-unify-acquisition-agencies/>.

⁴⁰ White House, *National Space Policy of the United States of America*, June 28, 2010, available at https://obamawhitehouse.archives.gov/sites/default/files/national_space_policy_6-28-10.pdf; and White House, *U.S. National Space Policy*, August 31, 2006, available at <https://web.archive.org/web/20101025140238/http://www.whitehouse.gov/sites/default/files/microsites/ostp/national-space-policy-2006.pdf>.

This seemingly minor opposition in vision, tone, and emphasis can translate into very significant differences at the practical level, influencing what national security space programs are pursued and what defensive or offensive actions are taken. The Bush and Trump policies addressed the rights of the United States to defend itself against purposeful interference of its space systems; the Obama policy spoke in terms of a vision of “nations’ rights,” making it more of a globalist than a U.S.-centric document. The Obama policy emphasized space-related arms control (“the United States will consider proposals and concepts for arm control...”), an apparent change from the Bush policy, which emphasized that the United States “would not accept any type of legal limitations on the US freedom of action in space.”

The Bush, Obama, and Trump policies all recognize the importance of international cooperation. Compared to the Bush and Trump visions, however, the dominant vision of the Obama policy was more of a rallying cry for “humanity’s reach in space.”⁴¹ A reading of the “Introduction” of the Obama space policy, which offered perhaps the clearest statement of his administration’s vision, significantly downplayed the national security elements in the policy, saving until the very end a statement on the importance of maintaining freedom of space.

This particular reference to freedom of space in the Obama vision is laid out through a somewhat limited view of the history of U.S. activity in space, framing it in this way: from the outset of the space age, “this Nation declared its commitment to enhance the welfare of humanity by cooperating with others to maintain the freedom of space.” In reality, while the nation has always striven to work cooperatively with other nations to ensure stability

⁴¹ White House, *National Space Policy of the United States of America*, June 28, 2010,

and the peaceful uses of space, U.S. national security concerns have always figured most prominently.⁴²

Intelligence officials recognized in the 2011 *National Security Space Strategy* that “space is becoming increasingly congested, contested, and competitive” and asymmetric space threats were growing.⁴³ To prevent attacks, the 2011 space strategy proposed that the U.S. would: support diplomacy and pursue international partnerships “that encourage potential adversary restraint”; improve the ability to know who is attacking U.S. systems; strengthen the resilience of U.S. space architectures (passive defenses); and, “retain the right to respond, should deterrence fail.”⁴⁴ Quite the opposite of viewing space as a warfighting environment, the Obama strategies strove to counter the idea that the United States might have to be prepared to engage in space combat to protect its interests.⁴⁵ Indeed,

⁴² The 2010 *National Space Policy* did direct the Secretary of Defense to, “Develop capabilities, plans, and options to deter, defend against, and, if necessary, defeat efforts to interfere with or attack U.S. or allied space systems.” Nevertheless, funding priorities and public rhetoric did not lend any seriousness to the Obama Administration’s support for measures to enable the U.S. military to fight through the “increasingly congested, contested, and competitive” space domain.

⁴³ Department of Defense and Director of National Intelligence, *National Security Space Strategy: Unclassified Summary* (January 2011), pp. 1, 4. The strategy also cites the 2010 *Quadrennial Defense Review*: “U.S. forces must be able to deter, defend against, and defeat aggression by potentially hostile nation-states. This capability is fundamental to the nation’s ability to protect its interests and to provide security in key regions.”

⁴⁴ DoD and Director of National Intelligence, 2011 *National Security Space Strategy*, p. 10.

⁴⁵ Director of National Intelligence and Department of Defense, *National Space Security Strategy* (Washington, D.C: Director of National Intelligence, January 2011), p. 11, available at https://www.dni.gov/files/documents/Newsroom/Reports%20and%20Pubs/2011_nationalsecurityspacestrategy.pdf. The ability to “fight through” the degradation of space systems was good, of course, but,

officials from the Obama Administration have increasingly acknowledged the threats.⁴⁶ As Greg Grant, a Pentagon official in the Obama Administration, recently said, “There’s been a dawning realization that our space systems are quite vulnerable. The Biden Administration will see more funding—not less—going into space defense and dealing with these threats.”⁴⁷

By 2016, the U.S. strategy was further refined to emphasize, “it is no longer a question of *whether* the character of warfare is changing, but rather *how* the United States should strategically re-orient itself to deter aggression and be prepared to fight and win future wars.”⁴⁸ To that end, the Trump Administration prioritized the establishment of a U.S. Space Command and, later, a U.S. Space Force, which was designed to recognize “the centrality of space to America’s national security and defense.” That warfighting command will “ensure that America’s superiority in space is never questioned and never threatened.”⁴⁹

Early signals by the Biden Administration indicate that it will take a realistic view of threats to and in space.⁵⁰

when it came to protecting U.S. interests in space, the Obama Administration seemed to draw the line at passive defenses.

⁴⁶ The White House, National Security Strategy (Washington, D.C.: The White House, May 2010), p. 39, available at https://obamawhitehouse.archives.gov/sites/default/files/rss_viewer/national_security_strategy.pdf. Note the order of precedence, and how national security falls at the end of the list.

⁴⁷ Broad, “How Space Became the Next ‘Great Power’ Contest Between the U.S. and China.”

⁴⁸ DoD, *United States Space Force*, p.1.

⁴⁹ As reported in Robert Burns, “Trump declares new Space Command key to American defense,” *Associated Press*, August 29, 2019, available at <https://apnews.com/article/air-force-donald-trump-ap-top-news-politics-19f021f991844b348dc716f6f8851f7c>.

⁵⁰ According to Space Force Commander, General Raymond, “I have had an opportunity to talk with President Biden. The president and the

Secretary of Defense Lloyd Austin, during his confirmation hearings, called for new U.S. efforts to build “space-based platforms” and referred to space as a warfighting domain and an arena for great power competition.⁵¹ Austin believes there have been “significant shifts” in space warfare that he will consider when developing the next National Defense Strategy.⁵² In July 2021, the Secretary signed out a memo on norms for military activities in space that put restrictions on, among other things, tests that produce long-lasting space debris without also hamstringing future DoD activities and tests to develop space arms.⁵³ The Biden policy will be constrained by an international and security environment much different than that which enabled the Obama policy of de-emphasizing U.S. warfighting prowess in space. The

vice president came over to the Pentagon and met with the Joint Chiefs, so I was there and I had an opportunity to talk about the strategic environment that we face. I was very pleased to hear that the administration came out in full support of the Space Force. It was really clear that everybody understands the importance of space to our nation and just how critical the standup of the Space Force is to stay ahead of a growing threat.” Jacqueline Feldscher and Lara Seligman, “Q&A: Chief of Space Operations Gen. Jay Raymond,” *Politico Online*, February 26, 2021, available at <https://www.politico.com/news/2021/02/26/politico-pro-q-a-chief-of-space-operations-gen-jay-raymond-471646>.

⁵¹ See Sandra Erwin, “Biden’s Defense nominee embraces view of space as a domain of war,” *SpaceNews Online*, January 19, 2021, available at <https://spacenews.com/bidens-defense-nominee-embraces-view-of-space-as-a-domain-of-war/>. See also Advanced Policy Questions for Lloyd J. Austin, Nominee for Appointment to be Secretary of Defense, Senate Armed Services Committee, January 2021.

⁵² Tony Bertuca, “Austin promises new defense strategy and extensive reviews for Biden’s DOD,” *InsideDefense.com*, January 19, 2021, available at <https://insidedefense.com/daily-news/austin-promises-new-defense-strategy-and-extensive-reviews-bidens-dod>.

⁵³ Theresa Hitchens, “In a First, SecDef pledges DoD to Space Norms,” *Breakingdefense.com*, July 19, 2021, available at <https://breakingdefense.com/2021/07/exclusive-in-a-first-secdef-pledges-dod-to-space-norms/>

fact that space is increasingly a warfighting arena is a fact that cannot be walked back.

Military Space Activities: Legal and Political Considerations

Developing military policies and programs with regard to space is complicated by a broad range of existing space laws and policies. There are various prohibitions and restrictions strewn among different treaties and conventions (even futuristic prohibitions, such as the Outer Space Treaty provisions banning the establishment of military bases on the Moon), and there are familiar domestic policy controversies (reflected in political arguments) about placing constraints on and funding of military space programs.

Space Law and Treaties. Since the early years of the space age, there has been a growing interest among some nations to keep space from becoming a battleground, even as (or, perhaps, because) a growing number of nations has sought to leverage the space environment to support military activities on Earth. International space law regulating military activities is made up of many different provisions, rules, and norms found in domestic laws, international treaties and conventions providing detailed regulations of space activities, including the Charter of the United Nations (UN).⁵⁴ The Charter, of course, lays the basis for addressing self-defense, international aggression,

⁵⁴ Key Treaties and conventions affecting military space activities are: Charter of the United Nations, Limited (or Partial) Test Ban Treaty, Outer Space Treaty, Liability Convention, and the Registration Convention. See also Louis de Gouyon Motignon, "The Legality of Military Activities in Outer Space," *Space Legal Issues*, January 24, 2019, available at <https://www.spacelegalissues.com/space-law-the-legality-of-military-activities-in-outer-space/>.

and the inherent rights of all nations that extend to the space domain.

There are weapons-related activities, national security operations and activities, and scientific experiments that may have applicability to national security that are permissible in space under the current legal regime. Some believe there is a significant gray area as to what constitutes an attack—satellites are jammed frequently, for example, but does it amount to an attack?⁵⁵ No doubt, the answer to that question will be found in the *consequences* of the active space countermeasure: did it happen during a critical space operation, and was the damage or interference permanent? The testing and deployment in space of conventional weapons (kinetic and non-kinetic), to include terrestrial-based anti-satellite and missile defense interceptors, are permitted under current international law. There is significant international disapproval of any operations that cause the proliferation of space debris.⁵⁶

Essentially, the current space legal regime permits a wide range of military space activities. Some of the more important restrictions, or non-restrictions, on military activities are highlighted below:

- Common interpretation of Article 51 of the UN Charter allows for any nation to claim the right of self-defense, which can be used to justify unilateral

⁵⁵ Not attributed, "An arms race is brewing in orbit," *The Economist*, August 15, 2020, p. 53, available at <https://www-economist-com.libproxy.ncl.ac.uk/science-and-technology/2020/08/15/an-arms-race-is-brewing-in-orbit>.

⁵⁶ Joanne Wheeler, "Space debris: The legal issues," *Royal Aeronautical Society* website, available at <https://www.aerosociety.com/news/space-debris-the-legal-issues/>. "Current space laws do not really address issues and liabilities relating to space debris." See, ad for Panish Shea & Boyle LLP, "Space Law: Liability for Space Debris," available at <https://www.aviationdisasterlaw.com/liability-for-space-debris/>.

measures involving the use of force and actions that may be otherwise interpreted as illegal under Article 2(4), which states that no state shall threaten or use force in a manner that is inconsistent with the purposes of the UN. The articles protecting the right of self-defense are not limited by geography and are not restrictive of military activities.⁵⁷

- The 1967 Outer Space Treaty states that activities on the Moon and other celestial bodies should be used for peaceful purposes, which does not prohibit non-aggressive military activities.
- Signatories may not test nuclear weapons in outer space or any other environment where radioactive debris is caused to be present outside the territorial jurisdiction of the testing state. Such activities are limited by the 1963 Limited Test Ban Treaty, to which the United States is a signatory.⁵⁸
- Signatories to the Outer Space Treaty may not deploy nuclear weapons or weapons of mass destruction (WMD) in orbit; the latter are typically understood to be nuclear, biological, chemical, and/or radiological

⁵⁷ "America needs a better understanding of what is occurring in space, what constitutes a hostile action or intent, and a fully developed plan for discussing preemption with the international community to make preemption a viable strategic option." In Edward G. Ferguson & John J. Klein, "It's Time for the U.S. Air Force to Prepare for Preemption in Space," *War is Boring*, April 22, 2017, available at <https://warisboring.com/its-time-for-the-air-force-to-prepare-for-preemption-in-space/#:~:text=Considering>.

⁵⁸ Argun Makhijani, "On January 22, 2021, nuclear weapons will be illegal under international law," *Institute for Energy and Environmental Research blog*, October 2020, available at <https://ieer.org/news/the-nuclear-weapons-ban-treaty-gets-set-to-enter-into-force/> "On January 22, 2021 – 90 days after the fiftieth ratification – the nuclear ban treaty will enter into force. From that day onwards, all aspects of nuclear weapons will be illegal under international law."

weapons, and there is a restriction on installing WMD on celestial bodies. The Outer Space Treaty also does not ban the operational deployment of fractional orbital bombardment system (FOBS) weapons (which utilize a partial orbit to deliver a weapons payload, including a nuclear-armed payload) or nuclear-armed ballistic missiles.

- Harmful or malicious interference with the proper functioning of space systems of other nations is prohibited in the Outer Space Treaty and other conventions and treaties (arms control treaties such as the 2010 New START Treaty identify these systems as “national technical means” of verification, such as monitoring performed by satellite imaging).

There are also domestic space laws that must be taken into account by policy makers, beginning with the 1958 National Aeronautics and Space Act. These laws mainly address commercial activities. Of course, the FY2020 National Defense Authorization Act created a sixth military service, the U.S. Space Force, within the Department of the Air Force.

U.S. Space Policy. As of this writing, the most current National Space Policy was issued on December 9, 2020. The March 23, 2018 *National Space Strategy* covers national security activities. The Defense Department issued additional guidance to defense planners when it released in June 2020 the *Defense Space Strategy*. The National Space Council, disbanded in 1993 and reestablished in 2017, also issued directives that impact military space activities, mainly a March 23, 2018 directive on the *National Space Strategy*, as noted above, and the February 19, 2019 directive calling for the establishment of a Space Force.

Politics and Political Restrictions. Space weapons programs have been politically controversial throughout the space age. Administrations have advocated either for or

against ballistic missile defenses or anti-satellite capabilities with space- or ground-based components at different points in history. President Reagan's Strategic Defense Initiative, in particular, brought many of the arguments against "weaponizing space" to the forefront of public discussions. Debates over space weapons have traditionally revolved around the sanctity of the space environment and the dangerous instabilities that may arise with the introduction of weapons in space.⁵⁹ One would expect the following key arguments to be raised should the United States initiate a space weapons program:

- *The Weaponization of Space.* In many ways, space continues to be viewed as a place to be kept free of earthly quarrels and competitions. To those who view space as an environment that must remain unsullied by conflict, activities that are of a military nature, especially if they involve weaponry, are among the most offensive.⁶⁰

Space has been used for decades to enhance and facilitate military operations on Earth. The questions seem to center around: 1) deployment of terrestrial- or space-based kinetic or non-kinetic weapons to terminate or destroy a satellite, or, 2) deployment of weapons in orbit for missile defense, space control, or striking targets on Earth. The arguments of critics, to include Chinese and Russian critics, include: such deployments would further

⁵⁹ See, for example, Ramin Skibba, "The Ripple Effects of a Space Skirmish," *The Atlantic Online*, July 12, 2020, available at <https://www.theatlantic.com/technology/archive/2020/07/space-warfare-unregulated/614059/>.

⁶⁰ See Michael P. Gleason and Peter L. Hays, "A Roadmap for Assessing Space Weapons," *Aerospace.org*, October 2020, available at https://aerospace.org/sites/default/files/2020-10/Gleason-Hays_SpaceWeapons_20201006_0.pdf.

weaponize space, be ineffective and costly, and would be destabilizing.⁶¹

- *International Instability.* Opponents of weapons in space argue that their deployment would lead to international strategic and crisis instability.⁶² Satellites are a stabilizing element in the strategic nuclear balance. They see and hear what is going on in other countries, are used for arms treaty verification, and help monitor the military and weapons development activities of other nations. Also, it is argued that failure to exercise restraint in space might upset U.S. foreign policy and destabilize international relationships.⁶³

⁶¹ James N. Miller and Frank A. Rose hit all of these arguments in "Order from chaos: How space-based missile defenses could make us less safe, not more," December 14, 2018, available at <https://www.brookings.edu/blog/order-from-chaos/2018/12/14/how-space-based-missile-defenses-could-make-us-less-safe-not-more/>. See for example Laura Grego, David Wright, and Stephen Young, "The Missile Defense Space Test Bed," Union of Concerned Scientists, May 2008, available at http://www.ucsusa.org/nuclear_weapons_and_global_security/space_weapons/policy_issues/the-missile-defense-space.html; for another rundown of the standard arguments, see Theresa Hitchens and Victoria Samson, "Space-Based Interceptors: Still Not a Good Idea," *Georgetown Journal of International Affairs*, Summer/Fall 2004, pp. 21-29.

⁶² See, for example, Bruce W. Macdonald, *China, Space Weapons, and U.S. Security*, CRS No. 38 (New York: Council on Foreign Relations, September 2008), p. v, available at <https://www.cfr.org/report/china-space-weapons-and-us-security>.

⁶³ "Space security depends at least as much on international cooperation as it does on national dominance." Patrick Stewart and Kyle L. Evanoff, "The Right Way to Achieve Security in Space: The U.S. Needs to Champion International Cooperation," *Foreign Affairs*, September 17, 2018, available at <https://www.foreignaffairs.com/articles/space/2018-09-17/right-way-achieve-security-space>

As noted above, technological advances by others, particularly Russia and China, are already threatening satellites and the peaceful nature of space. Thus, the question is less one of whether the United States will upset the balance if it chooses space-weapons capabilities, but rather one of whether the United States will constrain itself from responding to the changed political-military environment of space.⁶⁴ The all-important question now is which nation owns the space arms; the military-technical balance or imbalance is a subsidiary question.⁶⁵

- *Arms Race in Space.* The most frequently heard case against taking weapons into space is that such actions would fuel an arms race and lead the country into a chain of mechanical action-reaction responses.⁶⁶ Such arguments are made whenever an administration proposes exploring military options that leverage the space environment, such as space-based interceptors.⁶⁷ The president who drew the

⁶⁴ For an excellent examination and discussion of (nuclear) deterrence strategy, especially as it relates to missile defense, see Keith B. Payne, *Redefining "Stability" for the New Post-Cold War Era* (Fairfax, VA: National Institute Press, 2021).

⁶⁵ Colin S. Gray, *Strategy and History: Essay's on Theory and Practice* (London: Routledge, 2006), p. 132; For a critique of stability theory, see Colin S. Gray "Strategic Stability Reconsidered," *Daedalus*, Vol. 109, No. 4 (Fall 1980), pp. 135-154.

⁶⁶ Hitchens and Samson, "Space-Based Interceptors," p. 25. See also Michael Krepon, "Weapons in the Heavens: A Radical and Reckless Option," *Arms Control Association*, November 2004, available at <https://www.armscontrol.org/act/2004-11/features/weapons-space>. See, for example, Aaron Bateman, "America Can Protect Its Satellites Without Kinetic Space Weapons," *WarOnTheRocks.com*, July 30, 2020, available at <https://warontherocks.com/2020/07/america-can-protect-its-satellites-without-kinetic-space-weapons/>.

⁶⁷ See, for example, Jon Harper, "Would Space-Based Interceptors Spark a New Arms Race?" *National Defense Magazine*, April 24, 2019, available

greatest ire in this regard was Ronald Reagan was his proposals to develop technologies for space-based ballistic missile defenses, to include an array of directed energy and kinetic weapons capable of destroying missiles in their boost or midcourse phase of flight.⁶⁸

Indeed, history has shown there are significant problems with attempts to understand arms acquisition by using the “action-reaction” theory.⁶⁹ There are also many problems associated with space arms control, especially when it comes to imposing binding limits on weapons and activities in space. Defining a space weapon is difficult and is just one of many problems negotiators will face. There are in fact a variety of possible threats to space systems, some of which may affect the ground segment. Verification of compliance and enforcement poses even more daunting challenges, especially when dealing with an opponent with a demonstrated propensity to cheat.⁷⁰

at

<https://www.nationaldefensemagazine.org/articles/2019/4/24/special-report-would-space-based-interceptors-spark-a-new-arms-race>.

⁶⁸ Harper, “Would Space-Based Interceptors Spark a New Arms Race?”

⁶⁹ David J. Trachtenberg, Michaela Dodge, and Keith B. Payne, *The Action-Reaction Arms Race Narrative vs. Historical Realities*, (Fairfax, VA: National Institute Press, 2021), available at <https://nipp.org/wp-content/uploads/2021/06/OP-6-final.pdf>.

⁷⁰ John Lauder, Frank Klotz and William Courtney, “How to avoid a space arms race,” *The Hill Online*, October 24, 2020, available at <https://thehill.com/opinion/national-security/522512-space-arms-control-small-steps-can-begin-to-overcome-the-obstacles>. See also Nayef Al-Rodhan, “Weaponization and Outer Space Security,” *GlobalPolicyJournal.com*, March 12, 2018, available at <https://www.globalpolicyjournal.com/blog/12/03/2018/weaponization-and-outer-space-security>.

- *Space Debris.* It is sometimes argued that increased orbital debris would result from a greater military presence and combat engagements in space. Critics have pointed out the pressing dangers posed by satellite debris to other space systems.⁷¹ Even small pieces of debris can damage or destroy multi-million-dollar satellites and spacecraft.⁷² Much of the world was forced to fret about the dangers posed by low Earth orbit debris following China's deliberate satellite destruction demonstration in May 2007.

What is important is to recognize here that, in the context of the current strategic environment, where space is increasingly seen as a warfighting environment, continued U.S. wavering in defense space policy will hinder the ability of the United States to defend itself and its allies.

⁷¹ See write-up and video in Anthony Bouchard, "The Dangers of Space Debris Explained," *labroots*, December 29, 2019, available at <https://www.labroots.com/trending/space/16475/dangers-space-debris-explained>.

⁷² Micah Zenko, "Waste of Space," *Foreign Policy*, April 21, 2014, available at <https://foreignpolicy.com/2014/04/21/waste-of-space/>.

Chapter 4

Executing DoD Missions and the Use of Space

This section examines critical military missions already identified by policy makers and defense planners, identifies how space capabilities might be able to improve the execution of those missions, and suggests capabilities military commanders might want to have available to them (requirements), and why they might desire them.

Today's Military Challenges

The unclassified summary of the 2018 *National Defense Strategy* (NDS) recognizes the reality that the United States currently faces great power competition from Russia and China and that, ultimately, the safety of the nation can be best secured through military strength and relative advantage. The Joint Staff published the unclassified 2018 *National Military Strategy* (NMS) to provide a Joint Force framework for protecting and advancing U.S. national interests and implementing the NDS. The 2019 *Missile Defense Review* (MDR) outlined a concerted effort to improve existing capabilities for both homeland and regional missile defense and supports innovative concepts and advanced technology development to provide more cost-effective U.S. defenses against expanding missile threats. The 2020 *Defense Space Strategy* (DSS) identifies how the Department of Defense will advance spacepower to enhance the ability of the Joint Force to compete, deter, and win conflicts in an increasingly challenging international security environment. As implementing documents for the 2017 *National Security Strategy* (NSS), we can use these Defense Department publications to identify some of the

key military requirements identified by American strategists and defense planners in the early 2020s.

A supreme requirement identified in the NSS is that the country be prepared to fight and win any plausible conflict that threatens U.S. vital interests.⁷³ During peace and in war, the mission of the Joint Force is to deter nuclear and non-nuclear strategic attacks and defend the homeland.⁷⁴ The Joint Force must be capable of defending the U.S. homeland from attack and projecting power globally for both offensive and defensive purposes.⁷⁵

The nature of the global strategic environment requires increased strategic flexibility and freedom of action, as well as preparedness to respond to contingencies even while ensuring general warfighting readiness.⁷⁶ The United States is one of the few countries that can reach out to any corner of the world to pursue a military objective or defend its interests. Maintaining favorable regional balances of power in the Indo-Pacific region, Europe, the Middle East, and the Western Hemisphere, and collaborating with and defending allies and international military partners from military aggression, are critical pieces to the power projection formula and maintaining peace and stability both regionally and globally.

According to the NSS, U.S. military forces must be capable of deterring and defeating the full range of conventional and nuclear threats to the United States, as well as developing new operational concepts and capabilities to win without necessarily being the dominant force in the air, maritime, land, space, and cyberspace domains. “Deterrence must be extended across all of these

⁷³ 2017 *National Security Strategy*, p. 28.

⁷⁴ 2018 *National Defense Strategy*, p. 6.

⁷⁵ 2018 *National Military Strategy*, p. 1, 2.

⁷⁶ 2018 *National Defense Strategy*, p. 8.

domains and must address all possible strategic attacks.”⁷⁷ The reason for this is that state and non-state actors have access to accurate and relatively inexpensive weapons and cyber tools to threaten and attack the United States, harm its military forces, or disrupt its economy.⁷⁸ Strong alliances and partnerships are also critical to sustaining U.S. military advantages.⁷⁹

According to the NDS, preparedness to fight and win wars will rely heavily on the use of space and require:⁸⁰

- Investments in resilience, reconstitution, and operations to assure space capabilities and resilient cyber defenses.
- Resilient and survivable command, control, communications, computers and intelligence, surveillance, and reconnaissance (C4ISR) capabilities.
- Development of layered missile defenses and disruptive capabilities for both theater missile threats and North Korean ballistic missile threats to the U.S. homeland.
- Ground, air, sea, and space forces that can deploy, survive, operate, maneuver, and regenerate in all domains while under attack.

Development of layered missile defenses is a requirement stipulated in the NSS and NDS and it received further elaboration in the 2019 MDR.⁸¹ The MDR

⁷⁷ 2017 *National Security Strategy*, p. 27.

⁷⁸ 2018 *National Defense Strategy*, pp. 5, 10.

⁷⁹ 2018 *National Defense Strategy*, pp. 4, 8, 9.

⁸⁰ 2018 *National Defense Strategy*, p. 6.

⁸¹ “The United States is deploying a layered missile defense system focused on North Korea and Iran to defend our homeland against missile attacks.” 2017 *National Security Strategy*, p. 8.

emphasizes that comprehensive missile defenses must include attack operations to defeat missile threats prior to launch. In addition to ballistic missiles, they should address emerging hypersonic and cruise missile threats (at least at the regional level). Also, missile defenses must leverage the space domain for sensors.⁸²

With respect to the orbital region around Earth, according to a Defense Department official who introduced the Department's 2020 *Defense Space Strategy*, "our desired conditions are a secure, stable, and accessible space domain."⁸³ To achieve these conditions, the strategy underscores the need over the next 10 years to transform its approach to space from a support function to a warfighting domain, by leveraging the use of space to generate, project, and employ power across all domains.⁸⁴ Requirements identified in the strategy include the development and fielding of capabilities to counter the hostile use of space, deter aggression and attacks in space and, if deterrence fails, be capable of "winning wars that extend into space."⁸⁵

National Security Space Missions and Support for U.S. Military Requirements

The U.S. ability to project power in the 21st century is predicated on its access to space and freedom to use space. A global power requires a global perspective, and the space domain offers a persistent presence over every inch of the Earth's surface. It makes it possible to have a military

⁸² Department of Defense, 2019 *Missile Defense Review* Fact Sheet, available at <file:///C:/Users/Steve/Documents/NIPP/Space%20Policy%20Project/MDR-Fact-Sheet-15-Jan-2019-UPDATED.pdf>.

⁸³ Kitay, "Defense Official Briefs Defense Space Strategy."

⁸⁴ DoD, *Defense Space Strategy Summary*, pp. 2, 6.

⁸⁵ DoD, *Defense Space Strategy Summary*, pp. 7, 8. See also Kitay Briefing, June 17, 2020.

presence, extend lines of communications into remote areas of the globe, and apply force at points very far removed from U.S. borders. Space allows unrestricted overflight over countries with very large interiors and over battlefields where it may not be possible for terrestrial-based sensors to see or fly into. This capability, and the general awareness of U.S. foes of U.S. global reach, can offer a powerful deterrent to potential adversaries and significantly reduce their ability to take offensive action against the United States using tactical, operational, or strategic surprise.⁸⁶ There are four military space missions that leverage or support this system and, of those, two of the mission areas (space support and space force enhancement) are well established and amply supported by current policy structures, rhetoric, budgets, and actions.

Space Support. Perhaps the most visible and thrilling mission area is space support, which essentially deals with space launches, but also includes activities that sustain space operations. The first condition for the exploitation of space is the ability to have reliable access there. According to the August 2020 *Space Capstone Publication*, during a conflict, when there may be urgent requirements to either insert new space capabilities into orbit or replace assets that have been attrited, “space launch must be dynamic and responsive, providing the ability to augment or reconstitute capability gaps from multiple locations.”⁸⁷

Reconstitution of space assets may be required to overcome interference with satellites that have resulted in the loss of space systems, especially if the satellite assets are critical to the warfighting effort. U.S. spaceports lie on the coasts, making them vulnerable to enemy attack with little

⁸⁶ United States Space Force, *Spacepower: Doctrine for Space Forces*, August 2020, pp. 20, 22, 28, available at https://www.spaceforce.mil/Portals/1/Space%20Capstone%20Publication_10%20Aug%202020.pdf.

⁸⁷ United States Space Force, *Spacepower: Doctrine for Space Forces*, p. 37.

warning. Significant work remains, of course, to attain the desired level of responsiveness and survivability. Today, U.S. space support capabilities are largely uncontested, and the country is able to insert payloads into orbit at will, something it has been able to do since the earliest days of the space age.⁸⁸

Space Force Enhancement. By far the most extensive use of space for military purposes today involves leveraging satellites to improve the performance of operations. This mission area is likely to continue to expand and receive significant investment for modernization. Force enhancement via the use of space is essential to military effectiveness and success in achieving nearly every NSS, NDS, and NMS defense objective identified above.

Viable and effective space operations ensure the Joint Force will continue to have access to satellites that are rightly viewed essential to modern-day joint warfighting. This includes reliable and global communications, assured command and control (especially over nuclear forces), interoperability with foreign forces, precise navigation and timing for synchronized operations, access to critical space-based guidance signals for its precision strike weapons, overhead infrared and visible light sensors to warn of attack and detect and track missiles. Space operations also enhance the ability to execute strike operations, conduct surveillance (including weather monitoring and forecasting), realize space domain awareness (identifying,

⁸⁸ One exception is the U.S. reliance on Russian space boosters to launch satellite payloads into geosynchronous orbit. See Loren Grush, "The Defense Department picks three companies to develop rockets for national security launches," *theverge.com*, October 10, 2018, available at <https://www.theverge.com/2018/10/10/17961832/defense-department-launch-service-agreement-ula-blue-origin-northrop-grumman>. See also Wayne Eleazer, "The engine problem," *The Space Review*, August 3, 2015, available at <http://www.thespacereview.com/article/2799/1>.

characterizing, and understanding space objects and activities), and gather intelligence.⁸⁹

Space Control. Access to space is vital to national security, and is also critical to the nation's economic prosperity. The U.S. Space Force sees one of its key responsibilities to be the protection of space commerce and freedom of action for the United States and its allies.⁹⁰ The NDS highlights that, "new threats to commercial and military uses of space are emerging, and that, during a conflict, attacks against our critical defense, government, and economic infrastructure must be anticipated."⁹¹ U.S. space assets are, of course, part of that critical infrastructure. Thus, "we are left with no choice but to ensure we are prepared with the necessary means to protect and defend ourselves from attacks to our systems whether they be in space, on the ground or any other domain."⁹²

⁸⁹ See, for example, Nathan Strout, "Satellites played had a starring role at Project Convergence," *C4ISRNET.com*, October 12, 2020, available at <https://www.c4isrnet.com/digital-show-dailies/ausa/2020/10/12/us-army-uses-satellites-to-affect-the-state-of-the-battlefield/>.

⁹⁰ Sandra Erwin, "Space Force outreach emphasizes role protecting global space economy – Lt. Gen. Liquori: Access to the space domain is vital to economic prosperity," *SpaceNews Online*, September 9, 2020, available at <https://spacenews.com/space-force-outreach-emphasizes-role-protecting-global-space-economy/#:~:text=Space%20Force%20outreach%20emphasizes%20role%20protecting%20global%20space%20economy,-by%20Sandra%20Erwin&text=Having%20free%20access%20to%20the,a%20the%20annual%20DefenseNews%20conference.>

⁹¹ 2018 *National Defense Strategy*, p. 3.

⁹² Kitay, "Defense Official Briefs Defense Space Strategy." See also Sandra Erwin, "Top commander of U.S. space forces: Space should be peaceful, bad actors will be held accountable," *Space News*, November 2, 2020, available at <https://spacenews.com/top-commander-of-u-s-space-forces-space-should-be-peaceful-bad-actors-will-be-held-accountable/#:~:text=Magazine%20Subscription%20Info,Top%20commander%20of%20U.S.%20space%20forces%3A%20Space%20should%20be%20peaceful,actors%20will%20be%20held%20accountab>

This mission area starts with the ability to see objects and understand activities in space, that is, the achievement of space domain awareness (formerly referred to as space situational awareness). Persistent surveillance of the space environment using terrestrial and space-based sensors is required to detect, track, collect, disseminate, and characterize threat activity in all orbits; to undertake defensive and offensive counter-space operations; and, to execute an effective space deterrence strategy. Without “eyes” to see in space, it would be difficult to defend and fight in space and keep the peace.

The United States has a worldwide space surveillance network that tracks 24,000 to 100,000 objects in orbit—including operational satellites and debris—and the capabilities are getting better.⁹³ The newest capabilities will give visibility to unforeseen events, to include satellite maneuvers, and enable warfighters to search space to determine what an object is. Some of the most advanced and recently deployed systems include Geosynchronous Space Situational Awareness Program satellites, which monitor activities in an orbital zone where the United States has critical communications and early warning satellites.⁹⁴ If known to opponents, space surveillance assets can act as

le&text=Dickinson%3A%20%E2%80%9CWe%20have%20to%20ensure,d
omain%20in%20which%20to%20operate.%E2%80%9D.

⁹³ Stew Magnuson, “News from Space Symposium: Tracking Objects in Space Both Easier, More Complicated,” *National Defense*, April 11, 2019, available at

<https://www.nationaldefensemagazine.org/articles/2019/4/11/tracking-objects-in-space-both-easier-more-complicated>. Available at <https://www.nationaldefensemagazine.org/articles/2019/4/11/tracking-objects-in-space-both-easier-more-complicated>

⁹⁴ James Dean, “Delta IV blasts off with threat-detecting military satellites,” *Florida Today*, August 19, 2016, available at

<http://www.floridatoday.com/story/tech/science/space/2016/08/19/deltaiv-rocket-blasts-off-air-force-satellites-cape-canaveral-air-force-station-afspc6/88826330/>.

a deterrent to bad behavior to maintain a safe, secure, and stable space environment and help prevent collisions between satellites. Indeed, the United States shares space domain awareness information with other nations and commercial firms to reduce the chances of collision and thereby prevent the proliferation of debris.⁹⁵

Space control also requires capabilities as well as tactics, techniques and procedures for countering an adversary's space systems. Operators also may take advantage of weather conditions to disguise operations on the ground, avoiding detection by imagery satellites. Active measures might include radio-frequency telemetry jamming between satellites and ground stations. These capabilities have "reversible effects" and may temporarily impair a satellite. Cyber warfare may be used to disrupt a satellite's control signal encoding. Laser dazzling is a method for obscuring what an adversary can see from space. High-powered lasers, of course, also could be destructive to the optical sensors on a satellite (a non-reversible situation). Spacecraft or satellites designed to capture and fix or retrieve satellites might also be used in urgent scenarios to shut-down a hostile spacecraft.⁹⁶

⁹⁵ Sandra Erwin, "Space surveillance technologies a top need for U.S. military," *Space News Online*, November 22, 2020, available at <https://spacenews.com/space-surveillance-technologies-a-top-need-for-u-s-military/#:~:text=Gen.,-John%20Raymond%20said&text=WASHINGTON%20%E2%80%94%20Space%20tracking%20sensors%20and,U.S.%20Space%20Command%2C%20officials%20said.>

⁹⁶ Nathan Strout, "The Space Force doesn't want to send a human to do a robot's job," *C4ISRNET.com*, September 29, 2020, available at <https://www.c4isrnet.com/battlefield-tech/space/2020/09/29/no-the-space-force-wont-be-sending-humans-into-space-anytime-soon/>. See also Bill Gertz, "Second defector's knowledge of Chinese bioweapons reaches U.S.: Esper on Space Threats," *Washington Times Online*, September 16, 2020, available at <https://www.washingtontimes.com/news/2020/sep/16/second-china-defector-gives-biological-weapons-inf/>.

If a more robust response to countering enemy satellites is required, it may be possible to use kinetic and directed energy weapons that have non-reversible effects to terminate, destroy, or capture them. The United States does not have such weapons on hand, at least as far as the public record is concerned, but it has acknowledged it is interested in pursuing directed energy technology to protect U.S. satellites.⁹⁷ Ground- or sea-based interceptors for missile defense could be modified in extreme situations to function as space control weapons, but they do not represent an enduring space control capability and would produce space debris. There is little public acknowledgement that there are programs in place to develop and deploy kinetic-kill counter-space systems.⁹⁸ In any case, regardless of what may be on hand in the secret world, the policies currently in place are vague at best about *the use* of active and kinetic and even non-kinetic space denial capabilities.

A far greater concern for the U.S. military is the threat posed by adversarial counter-space assets.⁹⁹ Concerns about the range of destructive and reversible threats to the security of U.S. communications satellites and tactical networks continue to grow.¹⁰⁰ There are scenarios in which

⁹⁷ Nathan Strout, "The Space Force wants to use directed energy systems for space superiority," *C4ISRNET.com*, July 10, 2021, available at <https://www.crows.org/news/569986/The-Space-Force-wants-to-use-directed-energy-systems-for-space-superiority.htm>

⁹⁸ Eric Heginbotham, et al., *The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power, 1996-2017* (Santa Monica, CA: RAND Corporation, 2015), pp. 238-41.

⁹⁹ Author interview with Maj Gen Nina Armagno, Air Force Space Command, February 27, 2017.

¹⁰⁰ Defense Science Board, *Task Force on Military Satellite Communication and Tactical Networking: Executive Summary*, March 2017, available at http://www.acq.osd.mil/dsb/reports/2010s/DSB-MilSatCom-FINALExecutiveSummary_UNCLASSIFIED.pdf. Not to go unnoticed in the report is the vulnerability of the current ground network architecture to jamming. See also Rachel S. Cohen, "SPACECOM Boss Talks Wielding, Defending Satellites in Combat," *Air Force Magazine*

passive defenses will not be sufficient to protect satellite functions, and the employment of active defenses, or defensive force application, may be necessary. There are no dedicated, publicly acknowledged, active defenses against enemy terrestrial-launched or orbital anti-satellite weapons, although there are systems in the force that could engage them, especially before launch. Today, the United States does not appear to be in a position to respond with agility to destructive space threats, at least within the space environment.¹⁰¹ To develop such responsive capabilities would require a shift in policy to support development of a dedicated defensive ASAT capability.

Today, the most important statement made on this subject of space control has been made by the political leadership. The 2017 *National Security Strategy*, recognizing the pursuit of ASAT weapons by other nations, unequivocally concludes that space is a warfighting domain. “The United States considers unfettered access to and freedom to operate in space to be a vital interest. Any harmful interference with or an attack upon critical components of our space architecture that directly affects this vital U.S. interest will be met with a deliberate response at a time, place, manner, and domain of our choosing.”¹⁰²

Of course, “unfettered access to and freedom to operate in space” is the quintessential goal of the space control mission. The Space Capstone publication issued by the U.S. Space Force, the basis for the development of space warfighting doctrine, reminds us that “any loss of space

Online, November 6, 2020, available at <https://www.airforcemag.com/spacecom-boss-talks-wielding-defending-satellites-in-combat/>.

¹⁰¹ Cited in Jim Scitutto, “US military prepares for the next frontier: Space war,” *CNN*, November 29, 2016, available at <http://www.cnn.com/2016/11/28/politics/space-war-us-military-preparations/>.

¹⁰² 2017 *National Security Strategy*, p. 31.

domain freedom of action compromises the other two responsibilities [to make the Joint Force an effective force and providing the national leadership options in a crisis or conflict]. *Thus, preserving freedom of action in space is the essence of military spacepower and must be the first priority of military space forces.*"¹⁰³ This is a military requirement clearly stated.

Space Control Corollary: Requirement for Space Deterrence. Since the primary objective of space deterrence is to prevent attacks on U.S. space systems, space deterrence may be viewed as a corollary of the space control mission. Exploitable vulnerabilities invite attack, and there is no way to protect a single satellite against a determined attack.¹⁰⁴ General Raymond explained that "[o]ur goal is not to get into a conflict, we want to deter it."¹⁰⁵ Former Secretary of the Air Force, Barbara Barrett, argued that, "we have got to be able to deter derogatory action in space, and if deterrence

¹⁰³ *Spacepower: Doctrine for Space Forces*, p. 44. Italics in original.

¹⁰⁴ Doug Loverro, Former Deputy Assistant Secretary of Defense for Space Policy, "Space Warfighting Readiness: Policies, Authorities, and Capabilities," *Statement before the House Armed Services Committee*, March 14, 2018.

¹⁰⁵ Sandra Erwin, "U.S. Space Force unveils doctrine explaining its role in national security," *Space News*, August 10, 2020, available at <https://spacenews.com/u-s-space-force-unveils-doctrine-explaining-its-role-in-national-security/>. See also Gen. John Raymond, "Media Roundtable with U.S. Space Command Commander Gen. John Raymond," *U.S. Department of Defense*, August 29, 2019, <https://www.defense.gov/Newsroom/Transcripts/Transcript/Article/1949346/media-roundtable-with-us-space-command-commander-gen-john-raymond/> See also Katrina Manson and Christian Shepherd, "US military officials eye new generation of space weapons: Pentagon planners worry about China's extraterrestrial advances – including its version of GPS," *Financial Times*, September 2, 2020, available at <https://www.ft.com/content/d44aa332-f564-4b4a-89b7-1685e4579e72>.

doesn't work, we need to be prepared to be something other than a victim with our space assets."¹⁰⁶

The current U.S. approach to deterrence of attacks in space is to deny the adversary victory by reducing the likelihood of success, that is, deterrence by denial. This might be achieved by a disaggregated or proliferated satellite system, where it is assumed that this would lead the adversary to decide not to attack at all.¹⁰⁷ Different orbits, mobility, hardening, deception, satellite backups, decentralizing functions critical to national security, and distributed architectures can be used to make U.S. space architectures resilient or less attractive targets.

By merely threatening to attack U.S. space systems unprotected by a strong deterrent or defenses, a country might be able to deter, or significantly alter the manner or willingness of the United States' entry into a conflict. Although deterrence by denial may deter aggressors from acting, it might not be sufficient against an optimistic, aggressive and determined adversary. A more comprehensive deterrence strategy—specifically the combination of denial and punitive approaches, coupled with the deployment of offensive retaliatory capabilities—may be required to convince an adversary that both the costs of initiating an attack would outweigh the benefits and that the likelihood of success would be low.

For deterrence to work, U.S. retaliation capabilities must be known to adversaries and they must believe that the United States has the will to use those capabilities.¹⁰⁸ While

¹⁰⁶ C. Todd Lopez, "Time to Move Forward with Space Force, Air Force Secretary Says," *U.S. Department of Defense News*, December 8, 2019, available at

<https://www.defense.gov/Explore/News/Article/Article/2034790/time-to-move-forward-with-space-force-air-force-secretary-says/>.

¹⁰⁷ See Lambakis, *Foreign Space Capabilities*, pp. 64-71.

¹⁰⁸ Former Secretary of the Air Force Heather Wilson has stated that, "there may come a point where we demonstrate some capabilities so that our adversaries understand that they will not be able to deny us the

in some situations it might be desirable to avoid being explicit about the gravity and timing of a U.S. response, an opponents' anticipation of the consequences of its prospective aggression is necessary for deterrence to work.

Deterrence of attacks on space systems presents special challenges: the defender must be able to identify who did what to whom and respond in a timely manner. It is helpful for the deterrer to see or know about the threat before he can deter it.¹⁰⁹ Also, there is the consideration of the appropriate response, keeping in mind that a response may be issued in a domain other than space. For example, threatening to destroy a nation's spaceport or critical communications node on Earth in response to aggressive action in space may be more effective than threatening the aggressor nation's satellites.¹¹⁰ Not all countries have the same respect for the space domain or are as active in the space domain as countries that rely heavily on space systems for their economy and security. Another consideration is whether the satellite under attack is a critical national security asset, belongs to an ally or partner, or is a commercial platform. Punitive responses in the case of interference with allied space systems open up the possibility of follow-on attacks against U.S. space systems.

use of space without consequences." Aaron Bateman, "America Can Protect Its Satellites Without Kinetic Space Weapons," *WarOnTheRocks.com*, July 30, 2020, available at <https://warontherocks.com/2020/07/america-can-protect-its-satellites-without-kinetic-space-weapons/>.

¹⁰⁹ General John E. Hyten, USAF, *Hudson Institute Holds Webinar on National Defense Strategy (August 12, 2020)*, available at <https://www.hudson.org/events/1853-video-event-general-john-e-hyten-on-progress-and-challenges-implementing-the-national-defense-strategy82020>.

¹¹⁰ For an opposing viewpoint, see Jim Cooper, "Updating Space Doctrine: How To Avoid World War III," *WarOnTheRocks.com*, July 23, 2021, available at <https://warontherocks.com/2021/07/updating-space-doctrine-how-to-avoid-world-war-iii/>

Punitive actions in times of war would likely be less problematic than retaliatory actions taken during peacetime.

There are other special challenges to space deterrence. The kinetic destruction of space systems might be part of an offensive package, but only when the stakes at hand are greater than any concern over the proliferation of space debris. When it comes to deterrence in peacetime, such a threat may be considered highly suspect. In-kind threats against a state that does not depend on space may provide little deterrent effect. When considering space systems and deterrence in crises, it is also important to take into account the type of weapon used (e.g., does it produce reversible or irreversible effects?), the type of target (e.g., commercial satellite or nuclear command and control satellite?), and the situation on Earth at the time.

Another special challenge is deterring non-destructive, reversible interference, which can be done through jamming or dazzling, for example. Cyber-attacks would also fall into this temporary interference category. Nonetheless, temporary interference might have a profound strategic cost. For instance, GPS satellites may be jammed or interfered with over a particular region and only over a short time span, but that short period of interference may result in sporadic disruption in the use of GPS-guided weapons against time-sensitive targets (GPS-guided cruise missiles, perhaps) that fail to accomplish their mission. Temporary should not be equated with benign.

Space Force Application. Today, the United States has platforms and capabilities for executing a strike from land, sea, and air domains. There are no space-based strike weapons in the U.S. Joint Force to project power or defend against ballistic or hypersonic missiles. Force application in and from space might also involve the use of weaponry based in space to strike terrestrial targets. The United States currently has terrestrial-based weapons that fly at hypersonic and supersonic speeds, making it possible to strike any point

on the globe within a short period of time. It is possible to leverage suborbital or even orbital capabilities to accomplish the same military objective of destroying targets on Earth in an even shorter period of time. Currently, there is no military requirement for a capability to strike targets on Earth from space. The United States explored the possibilities of offensive space strike weapons early in the space age,¹¹¹ and the Soviet Union at one time developed what it called a fractional orbital bombardment system to leverage the suborbital region to carry a payload farther than a ballistic missile. Such weapons use gravitationally curved trajectories to travel into space and deliberately reenter the atmosphere before a complete circumnavigation of Earth. It is not clear whether the United States ever fully explored the tactical and strategic utility of such weapons.

Space or suborbital strike weapons might be able to improve U.S. non-nuclear deterrence, accomplish a rapid strike against mobile ballistic missile launchers, or destroy hard and deeply buried targets, for example. However, the country never ventured down this path, not for technical reasons, but for the absence of persuasive advocacy and a fully developed strategic and operational rationale. The strategic utility of such weapons would need to be explored before committing the country to their development. This also is political territory that has never been fully explored; it would likely require a significant effort to develop a national consensus and allied understanding around an offensive space strike capability.

¹¹¹ See, for example, Jonathan Shainin, "Rods from God," *The New York Times*, December 10, 2006, available at <https://www.nytimes.com/2006/12/10/magazine/10section3a-t-9.html>, and Larry G. Sills, *Space-based Global Strike: Understanding Strategic and Military Implications*, August 2001 available at <https://apps.dtic.mil/dtic/tr/fulltext/u2/a407068.pdf>.

Chapter 5

Refining National Security Space Vision and Policy for 21st Century Warfighting

Former Secretary of Defense, Dr. Mark Esper, summed up the future of warfighting: “In the years ahead, wars will be fought not just on land and sea as they have for thousands of years, or in the air as they have for the past century, but also in outer space and cyberspace in unprecedented ways.”¹¹² Esper conveyed that, due to the changed technological and military threat environment, the United States can no longer afford to back away from the idea of defending U.S. interests in space and, if necessary, fighting in space.

U.S. published strategies and space doctrine, as well as Defense Department organizational decisions, have moved the nation toward a better understanding of why and how the United States must defend its interests in space. Yet the reasoning behind the former Secretary’s statement appears to be not fully understood throughout the U.S. policy-making community. As a result, support for U.S. defensive and deterrent capabilities are inconsistently expressed in the words and actions of the nation’s leadership.

However, the events that inspired the former Secretary’s declaration have transpired and the genie truly is out of the bottle. Thus, the Joint Force must be ready to engage with hostile actors in the space environment as

¹¹² Bill Gertz, “Second defector’s knowledge of Chinese bioweapons reaches U.S.: Esper on Space Threats,” *Washington Times Online*, September 16, 2020. Available at <https://www.washingtontimes.com/news/2020/sep/16/second-china-defector-gives-biological-weapons-inf/>.

needed, using appropriate weapons, possibly *in unprecedented ways*, and in a manner that is fully authorized, funded and supported by the American political leadership and public. If the nation is to be in a position to defend itself and pursue its national interests in the age of satellites, the foundations of its national security space policy must be formed and solidified.

The latest U.S. space policy reflects many of the familiar statements made by Administration and Defense Department officials, including this statement made in the 2017 *National Security Strategy*: “The United States considers unfettered access to and freedom to operate in space to be a vital interest. Any harmful interference with or an attack upon critical components of our space architecture that directly affects this vital U.S. interest will be met with a deliberate response at a time, place, manner, and domain of our choosing.”¹¹³ This is an interesting statement, one of many similar statements made by former administration officials since 2017, yet it also captures the inconsistent nature of current space policy framework. On the one hand, we speak in full recognition of space as a domain available for tactical military exploitation. Yet, on the other, in what we do and what we *really* think, space is treated as a sort of haven from hostilities.

The real controversy with the statement is not centered on the means—the resources, weapons, organizations, or strategies—but on the ends expressed by the vision and purpose. The NSS statement is a good statement on paper, to be sure. It seems to offer the policy basis for establishing space control. However, it is also sufficiently vague, so as to leave in doubt whether the United States is actually committed to developing and deploying defensive or offensive space control capabilities. For example, the

¹¹³ 2017 *National Security Strategy*, p. 31. This statement would be strengthened by including “purposeful and” before “harmful.” See also *National Space Policy*, December 9, 2020, pp. 3, 4, and 9.

statement fails to specify whether a possible requirement to deploy active satellite defenses, such as space-based interceptors or defensive ASATs—could be employed to prevent the interference with, or destruction of, a friendly satellite.

Fully sanctioned space combat activity means that, in the aftermath of the space-domain retaliatory action, there would be no accusations that the action taken was a provocation and unprecedented incitement to initiate a space war. It means military leaders would not have to tiptoe around public space weapon discussions for fear of crossing a line of political correctness.¹¹⁴

To be fully sanctioned means the nation's allies would generally understand the course of action that had been taken and, although there might not be full agreement with U.S. decisions and actions, they would have little difficulty aligning themselves with their international partner in the court of world opinion. U.S. diplomats and international partners would not be on the defensive about Washington's statements about the need for "space superiority"¹¹⁵ or dominance and would be fully armed to resist calls by

¹¹⁴ "When asked when the Space Force might field offensive weapons, Raymond demurred but insisted the United States considers space a vital national security interest." See Abraham Mahshie, "Gen. Jay Raymond previews Space Operations Command stand up," *Washington Examiner Online*, October 21, 2020, available at <https://www.washingtonexaminer.com/policy/defense-national-security/exclusive-gen-jay-raymond-previews-space-operations-command-stand-up>.

¹¹⁵ Terms like 'space superiority' are politically problematic. Russia and China will use them to falsely claim that the United States is responsible for 'weaponizing' outer space, even though it is those countries that are aggressively developing and deploying anti-satellite weapons." Frank A. Rose, "The U.S. Defense Space Strategy works on paper, but will it be implemented?" *Brookings.edu*, July 6, 2020, available at <https://www.brookings.edu/blog/order-from-chaos/2020/07/06/the-u-s-defense-space-strategy-works-on-paper-but-will-it-be-implemented/>.

America's hostile detractors and strategic competitors to force the United States to answer or pay for its "outlandish behavior."

To be fully sanctioned means that the administration would have its defenders in the domestic and foreign press, the think tanks, and the universities. It means that a sufficiently educated American public would show a fair amount of support in the latest polls conducted to measure reaction to the most recent space combat engagement. If administration officials do not have to dive into a bunker or constantly dodge verbal projectiles thrown at them in the wake of a defensive action to protect U.S. space assets, then a fully sanctioned policy exists.

For space policy to be fully sanctioned, other supportive actions by the nation's leadership and across the government are required. The policy-making process starts with a vision that clearly expresses the nation's will to protect and extend the freedom of American public and private interests to function safely and securely in space. That vision also should highlight the idea that U.S. interests are best served when the United States is viewed by other nations to be the preeminent military power in space, not so that it can act in a dominant, controlling or imperialistic fashion toward other states, but so that it can be free to act as needed to protect its interests and deter aggressive behavior against itself and its allies.

The Importance of U.S. Public Opinion

Abraham Lincoln observed that, in the United States, a regime that is perhaps best characterized as a constitutional or democratic-republic, "public sentiment is everything." With it, the chances of success are good; without it, expect failure. So, Lincoln wrote, "he who molds public sentiment goes deeper than he who enacts statutes or pronounces

decisions. He makes statutes and decisions possible or impossible to be executed."¹¹⁶

There are at least three key points that must be conveyed to the U.S. and foreign public. The first is the fact that space is vital to daily life as we know it. "The importance that space plays in our daily lives and in the defense of our nation is often overlooked or understated," writes General John Raymond.¹¹⁷ The American public does not fully understand why and how space marshals all the instruments of national power to strengthen the country economically and militarily. Until the public understands this, support is likely to be elusive.

The second key point concerns consequences of a U.S. failure to protect the nation's interests in space, defend its assets, or protect its territories from attacks that use space. Space is of value beyond its venue for space-based sensors and communications networks. It is also a domain wherein the United States might find it advantageous to deploy missile defense or satellite-defense interceptors, for example.

The third key point is that it will be important for the public to understand what U.S. leaders mean when talking about space control. Specifically, it does not mean overbearing dominance in space, which is impossible and, in any case, not desirable. The meaning of "control" will come down to conveying to domestic and foreign audiences what is being controlled (an orbit or a spacecraft), for how long it is being controlled, and the purposes for which it is being controlled.

The reality of possible conflict in space almost certainly will bring significant headaches in international diplomacy.

¹¹⁶ First Lincoln-Douglas debate, Ottawa, Illinois, August 21, 1858, in Roy P. Basler, ed., *The Collected Works of Abraham Lincoln* (New Brunswick, NJ: Rutgers University Press, 1953), pp. 12-30.

¹¹⁷ Raymond, "Space dominance requires taking technology and policy risks."

Deterrence and warfighting practices and theories of stability will have to be reexamined. New and more vicious budget wars will arise, yet shoring up the nation's ability to defend and promote its space interests is nevertheless something that must be ultimately worked through.

Security Classification Involving Space Systems

Sixty-years old rules established to protect sensitive information largely remain in place today and exceed even the norms and rules in programs involving the land, sea, air and cyber domains. Stove-piping, the refusal to share information among key government stakeholders and allies, remains a highly frustrating problem in the national security space community.¹¹⁸ The problems will remain significant without a policy that recognizes the shortcomings of current information-sharing practices.

Specifically, the public needs information on the “who?”, “what?”, and “so what?” of space threats.¹¹⁹ This information must be conveyed in a manner and language that increases public understanding of the issues. The Defense Department and U.S. intelligence agencies have done a better job over the past few years of making materials accessible to the public. How or even whether the

¹¹⁸ Aaron Mehta, “Increasing allied role in space a ‘priority’ for Space Command head,” *DefenseNews.com*, September 3, 2019, available at <https://www.defensenews.com/space/2019/09/03/increasing-allied-role-in-space-a-priority-for-space-command-head/>.

¹¹⁹ General Raymond: “Our desire is to deter conflict from either beginning or extending into space. To do that deterrence, you have to change the calculus of your opponent. And to do that, you have to be able to talk and you have to be able to message.” Courtney Albon, “Hyten: ‘I’m going to be unbelievably loud’ about space overclassification,” *InsideDefense.com*, November 20, 2020, available at <https://insidedefense.com/daily-news/hyten-im-going-be-unbelievably-loud-about-space-overclassification>.

United States should pursue robust space defense technologies are questions that have yet to be answered adequately. Increasing awareness of the space threat among senior policymakers and government institutes, the American public, and allied audiences must be a primary consideration.¹²⁰

A Unified Pursuit of Strategy

As is the case with any policy formulation, political unity is best. Bi-partisanship in a country such as the United States is empowering. The United States fought and won the decades-long Cold War with the Soviet Union primarily because the effort was supported by both political parties. This, of course, meant that there were no significant changes to the fundamental vision of Cold War victory, which led to consistent budgets and a true alignment of objectives within all branches of government.

A new vision for space, one that is bi-partisan in its fundamentals, would help ensure enduring, clear policy-and strategy-making. The bi-partisan policy should define U.S. national military posture in space, consider overall national foreign policy and military objectives, and make it possible to develop a strategy for U.S. spacepower designed to achieve the high ends of policy. Appropriately designed policy also will provide the framework for U.S. diplomats to formulate international norms of behavior and help shape the views of allies, partners, and potential adversaries about space as a warfighting domain. Clear strategy, of course, will enable the development of appropriate concepts to deter aggression and attacks in space, and win

¹²⁰ See also Nonproliferation Policy Education Center and American Bar Association, *Three Neglected Space Issues: Laser ASATs, Cooperation with Russia and China, and Space Secrecy – Workshop Report*, July 2020, pp. 16-24, available at npolicy.org/article_file/July_2020_Space_Policy_Workshop.pdf.

wars that extend into space should deterrence fail. These strategic concepts are required to write doctrine, design operational architectures, and adopt a targeted acquisition strategy.

A clear bi-partisan policy reflected in the nation's strategy will enable it to make the investments and take actions necessary to prevent the dominance of space by foreign powers. This would be essential to ensure continued access to space by U.S. and allied commercial interests and the Joint Force. The United States could execute strategy unilaterally and in concert with its allies as required. Strategic deterrence—defense of the homeland from nuclear or conventional attack—and space deterrence—prevention of aggressive acts in space—no doubt would be central to any 21st century U.S. strategy and bi-partisan authorization and funding.

The Centrality of Cooperation with the Allies

Clear language explaining to allies and international partners U.S. military space plans and actions will help U.S. leaders speak effectively to strategy, warfighting, and deterrence. In 2001 and 2002, the George W. Bush Administration consulted very closely and very effectively with U.S. allies and with Russia on its plans to withdraw the nation from the ABM Treaty and deploy homeland missile defenses. Similar steps should be undertaken to prepare for major changes in the U.S. space defense posture.

Washington's early consultation and collaboration on military space activities with its closest allies, such as the "Five Eyes" partners—a cooperative intelligence alliance among Australia, Canada, New Zealand, and the United Kingdom—France, Germany, and Japan, would go a long way toward solidifying its space age diplomacy, which includes communicating and enforcing its defense space

policy. U.S. allies are increasingly cognizant that space is an operational domain, and that Russia and China pose significant challenges in that arena.¹²¹ Indeed, U.S. leadership in this area since 2019 has induced several U.S. partners and allies to sign partnering agreements to cooperate on security in the space domain.¹²²

While improvements to allow some allies to “peek under the tent” have been made, the Defense Department, in general, continues its propensity to over-classify information in order to protect sensitive technologies and secrets, as noted above. This includes the generous assignment of classification levels that specifically restrict foreign nationals from viewing sensitive information.¹²³ The space capabilities and

¹²¹ Andrew Foxall, “China and Russia are seeking to conquer space itself in their shadow war against the West,” *The Telegraph Online (UK)*, November 21, 2019, available at <https://www.telegraph.co.uk/news/2019/11/21/china-russia-seeking-conquer-space-shadow-war-against-west/>; Theresa Hitchens, “Space Force Reaches Out To New Partners-Eye on China,” *BreakingDefense.com*, January 13, 2021, available at <https://breakingdefense.com/2021/01/space-force-reaches-out-to-new-partners-eye-on-china/>. For an ally viewpoint, see Danielle Sheridan, “Russia and China pose ‘daily’ space threat,” *Daily Telegraph (UK)*, July 30, 2021, available at <https://www.pressreader.com/uk/the-daily-telegraph/20210730/281496459322235>

¹²² Abraham Mahshie, “Space Command's Gen. Raymond cites allies' space commands and partnerships,” *Washington Examiner Online*, October 22, 2020, available at <https://www.washingtonexaminer.com/policy/defense-national-security/exclusive-space-commands-gen-raymond-cites-allies-space-commands-and-partnerships>. See also Theresa Hitchens, “Space Command Widens Embrace Of Allies,” *BreakingDefense.com*, November 5, 2020, available at <https://breakingdefense.com/2020/11/space-command-widens-embrace-of-allies/>. See also Joshua Posaner, “U.S. Space Force seeking alliances in Europe to guard orbit,” *Politico Europe*, July 22, 2021.

¹²³ For an excellent summary of these issues, see Mark Pomerleau, “Info-sharing hurdles hinder alliance partnerships,” *C4ISRNET.com*, August 7, 2016, available at

expertise of the United States are not easily matched by other nations, which means there is a natural technology and capability gap between the United States and its foreign military partners. It is imperative U.S. policy continue to bring along allies in order to maintain the ability to fight side-by-side with friendly powers. Policy should facilitate technology-sharing. In the same manner as sea control and air superiority, space control is an expression that must be fully understood by U.S. leadership so that it can be properly conveyed to allied audiences.¹²⁴

Budget

Part of the policy-making process must include resource considerations. Current space policy does not provide a sufficiently persuasive rationale of why investment is required to promote and develop robust space warfighting capabilities. After all, where the nation spends its money reveals where its priorities lie. A revitalized space policy would provide the justification for spending money on what is bound to be a very expensive activity. Moreover, without a well-developed and clear policy stating Washington's vision and long-term plans for space and outlining its approach for meeting its plans, private industries will not be inspired to invest heavily in the development of capabilities. Without a clearly articulated policy that has congressional support, government and private interests will likely be reluctant to commit resources to fund new national security space initiatives.

<https://www.c4isrnet.com/videos/2016/08/07/info-sharing-hurdles-hinder-alliance-partnerships/>.

¹²⁴ Theresa Hitchens, "US, Allies Agree On Threats In Space But Struggle With Messaging," *Breaking Defense*, September 11, 2020.

Aligning Space Control Requirements and Policy

We have already shown that U.S. space support infrastructure and force enhancement satellites have received significant policy support and budgetary attention since the dawn of the space age. These space assets are critical to deterring nuclear and non-nuclear strategic attacks, defending the homeland, and projecting U.S. power globally. Any deficiencies we might experience in the space support and space force enhancement areas are the result of budgetary constraints or defense planning choices, not an unsupportive policy structure.

This is not the case with the space control mission. The recognition of space as a domain that would be contested, an arena where a struggle may be required to maintain freedom of space, can be traced back to the administration of Dwight Eisenhower; including its political leadership as well as its military officials.¹²⁵ It was the case then, and is the case today, that U.S. military leaders have been the most vocal advocates for pushing the nation's acceptance of the idea of space as a contested domain, an arena of anarchy wherein struggle may be required.¹²⁶

¹²⁵ Lambakis, *On the Edge of Earth*, pp. 211-220. Although Eisenhower did flirt in public with the notion that space should remain a sanctuary for peaceful and scientific purposes (putting him at odds at times with his military advisors), U.S. policy even in these early days did recognize that nations could do other nations harm in space.

¹²⁶ "Russia is making considerable gains, and our operational advantage is shrinking." "China continues to develop a variety of counterspace capabilities designed to limit or prevent an adversary's use of its space-based assets during a crisis or conflict." Gina Harkins, "Space Wars: Why Top Military Leaders Say U.S. Must Prep for Battles Beyond Earth," *Military.com*, August 24, 2020, available at <https://www.military.com/daily-news/2020/08/24/space-wars-why-top-military-leaders-say-us-must-prep-battles-beyond-earth.html>. Sandra Erwin, "U.S. SPACECOM nominee Dickinson says countries must be held accountable for actions in space," *SpaceNews Online*, July

The reason there is such emphasis by strategic planners and military leaders on describing the need for a space control capability is because the country appears to lack reliable tools to conduct the mission today, despite the demonstrated need. This is not a failure of technology; it is a failure of policy. The remedy for this must begin with strong policy arguments. While the recognition of a space control requirement has been quite strong among the defense leadership and the Services, those voices in favor of a robust space control capability in the political arena have been more fleeting, vague, and disparate.¹²⁷ Advocacy for space control, what it is, and why the nation needs it, is not currently being done.

Force Application in Space

Space force application can be used for offensive and defensive purposes, and may be used to affect the course of a conflict or engagement in space or on Earth. It may contribute to space control, the requirements for which are discussed above, by conducting defensive operations to protect space systems, or offensive operations to impede temporarily or permanently an adversary's use of satellites. It may also be used to strike targets on Earth from space, or

28, 2020, available at <https://spacenews.com/u-s-spacecom-nominee-dickinson-says-countries-must-be-held-accountable-for-actions-in-space/>.

¹²⁷ A senior Defense Department advocate for U.S. military space capabilities testified before Congress about the growing threats to the U.S. space system but did not specifically address the need for space control capabilities; but rather, he spoke vaguely about the need to "accelerate the development and fielding of military space capabilities necessary to ensure U.S. and allied and partner technological and military advantages." Kenneth Rapuano, ASD for Homeland Defense and Global Security, written testimony before the House Armed Services Committee, March 11, 2020, p. 6, available at <https://docs.house.gov/meetings/AS/AS00/20200311/110692/HHRG-116-AS00-Wstate-RapuanoK-20200311.pdf>.

in a defensive mode, to protect strikes against friendly terrestrial targets (e.g., missile defense).

A Space-Based Interceptor (SBI), or a space-based laser, for example, potentially could be useful for defending friendly satellite constellations, and also could be used within the currently operational Missile Defense System to add an additional layer to homeland defenses against ballistic missiles. An SBI might also be useful against offensive hypersonic missiles that, once launched, initially fly a ballistic trajectory toward space before descending back to Earth to begin maneuvered flight.

There are several obstacles that lead officials to continually conclude that this issue warrants further study. There is concern that weapons in space will disrupt the existing “harmony” in orbits that currently traffic in military, civil, and commercial assets. The SBI debate also must consider any policy concerns about space control and space access denial. Space debris and possible debris chain reactions after a space strike are concerns also frequently raised. Cost is also raised, but, according to some, it is not a truly inhibiting factor.¹²⁸

Space policy must also take into account and objectively study the use of force application in space to protect space systems. In scenarios when passive defenses would not be sufficient to protect satellite functions, and the employment of active defenses, or defensive force application, might be necessary, if only to prevent a satellite kill that causes the proliferation of space debris in a particular orbit. If the

¹²⁸ Former Strategic Defense Initiative Organization Director Cooper cites then-Under Secretary of Defense for Research and Engineering, Michael Griffin, as saying: “I get tired of hearing how it could cost \$100-or-more billion to put up a space-based interceptor layer. The entire cost of a system with 1,000 SBIs could come in at about \$20 billion.” Henry F. Cooper, “Space-Based Interceptors: The Price Is Right!”, *Newsmax*, April 23, 2019, available at <https://www.newsmax.com/henryfcooper/brilliant-pebbles-price-estimate-space-defense/2019/04/23/id/912964/>.

conflict stakes are high, concerns about space debris and any domestic or international condemnation of the defensive action could pale in comparison.

In scenarios where U.S. military success absolutely depends on the control of an orbit, even if only for a short period of time, active offensive space control tools might be the only instruments that work with immediacy and reliability. It would be advantageous for the Joint Force to at least have that option. Space policy must provide the policy and resource framework necessary to do more than just watch what happens in the space battle arena and prepare active defenses or offenses.

Chapter 6

Recommendations

If the United States is to ensure space dominance, its administration and lawmakers must assume some policy risks at a time when near-peer competition in space continues to grow rapidly and significantly. The reasons for this are clear, General Raymond has stated: “Through intense study of our potential enemies, validated during multiple war-gaming exercises, we know that space is critical should our nation be plunged into conflict.”¹²⁹ A comprehensive defensive approach, which may include active offensive and defensive combat operations, is required to ensure national safety.

Defense space no longer simply involves the combat support function. All interested parties must assume, for defense planning purposes, that China and Russia, given the right opportunity and circumstances, could attack U.S. and allied spacecraft using kinetic or non-kinetic options. The nation may never experience such a combat situation, but, in light developments over the past several years, that statement may rightly be characterized as overly optimistic. It is better to plan and consider future possibilities, based on observations of state behavior. Given the need for freedom of operations in space, not only is it advisable for the country to adopt passive defense measures—such as disaggregated constellations for survivability, to deter a “first-strike” against U.S. spacecraft—it is also highly prudent to

¹²⁹ Raymond, “Space dominance requires taking technology and policy risks.” See also Manson and Shepherd, “US military officials eye new generation of space weapons” and Aaron Bateman, “America Can Protect Its Satellites Without Kinetic Space Weapons,” *WarOnTheRocks.com*, July 30, 2020, available at <https://warontherocks.com/2020/07/america-can-protect-its-satellites-without-kinetic-space-weapons/>.

evolve thinking and capabilities related to combat engagement involving space systems.¹³⁰

Policy that does not actually implement and evolve U.S. spacepower has the negative effects of inaction, inadequate action, or misguided action, and is potentially catastrophic with respect to the nation's ability to enforce its deterrence strategy or effectively fight a battle that may involve space warfare. The consequence of not working toward a solid, fully sanctioned policy when it comes to space warfare is that trouble surrounding this issue will continue to haunt this administration and future administrations. The collective unwillingness to do so, if it endures, will thwart future defense planning and budgeting, the formulation of appropriate strategies, and the ability of Washington to speak with a coherent voice to the American public and foreign governments.

Some special emphases are required in the areas of education, transparency, and foreign relations.

Education

General Raymond correctly identified the core problem facing this nation concerning greater security in space: "I think there's an awareness issue. The average person in the world doesn't understand how their way of life is linked to space. I don't think the average person understands the threat that exists today."¹³¹ The problem is, "satellites don't have mothers," stated the general; how then does

¹³⁰ See for example, the remarks of Army National Guard Maj. Gen. Tim Lawson in Jon Harper, "Space Command Hints at New Capabilities to Counter China, Russia," *National Defense Magazine Online*, August 21, 2020, available at <https://www.nationaldefensemagazine.org/articles/2020/8/21/us-space-command-hints-at-new-capabilities-to-counter-china-russia>.

¹³¹ Cited in Hitchens, "Raymond Urges NATO Space Ops; Europeans Fear Offensive Missions."

leadership convince people of the need to protect important national space assets?¹³² One cannot address the more challenging policy issues of space control and force application in space until the public understands why space is important, and how and why other nations may want to jeopardize U.S. assets in space. The American people need to understand that space warfighters are essential to the “American way of life” and the “American way of war.”¹³³

Strategic messaging properly coordinated within the government would include enhancing public awareness of deterrence approaches should tensions escalate. The message should emphasize that, as China and Russia continue to develop and field space weapons, the United States must also consider developing the offensive and defensive kinetic and non-kinetic systems necessary to mitigate an attack and limit any potential damage. All of this, of course, will require adequate resourcing as well as comprehensive and all-of-government awareness initiatives.

It is difficult to overemphasize the importance of clarity and transparency when it comes to developing U.S. space policy to prepare the country for 21st century warfighting. In fact, much information about the U.S. military's space programs is hidden from public viewing within a classified budget; this complicates efforts by the public and congressional representatives to know what is being discussed and planned and whether to be concerned about

¹³² Sandra Erwin, “Space Force eyes closer ties with civil space: ‘It’s good for taxpayers,’” *SpaceNews Online*, February 3, 2021, available at <https://spacenews.com/space-force-eyes-closer-ties-with-civil-space-its-good-for-taxpayers/>.

¹³³ Abraham Mahshie, “Space warfighters essential to ‘American way of life’ and ‘American way of war,’ says Gen. Jay Raymond,” *Washington Examiner*, October 27, 2020, available at <https://www.washingtonexaminer.com/policy/defense-national-security/space-warfighters-essential-to-american-way-of-life-and-american-way-of-war-says-gen-jay-raymond>.

significant capability shortcomings and national strategic needs.

Information Transparency

The lack of information transparency regarding national security space programs and activities has been a problem for many years. Overcoming the over-classification impediment is critical to public education and will require the energetic involvement of the entire government. While some progress has been made, the nation must continue to work the over-classification problem and open up to discourse the extremely limited discussion of a number of space programs.¹³⁴ Congressman Mike Rogers has underscored that, under current conditions, it is difficult to build support for both the public and members of Congress. According to Air Force Secretary Barbara Barrett: “The lack of understanding really does hurt us in doing things that we need to do in space.”¹³⁵

Information transparency must also be reviewed in U.S. international relationships. Despite the importance placed by the United States on supporting and interoperating with allies and military partners, a factor hindering joint and combined operations is restriction of information-sharing. There will be a need to protect some secrets while sharing others with coalition partners, and the right balance must be sought.

¹³⁴ The Space Force has begun to talk about its interest in pursuing directed energy systems to protect U.S. satellites. Nathan Strout, “The Space Force wants to use directed energy systems for space superiority.”

¹³⁵ Cited in Nathan Strout, “Barrett, Rogers plan to declassify black space programs,” *Defense News Online*, December 7, 2019, available at <https://www.defensenews.com/smr/reagan-defense-forum/2019/12/08/barrett-rogers-plan-to-declassify-black-space-programs/>.

Work Closely with Allies

The United States will need to develop and execute a coordinated plan for educating its international partners on its space vision and policy, and work to involve its allies in providing interoperable capabilities for combined space operations. To do so would be a significant step beyond simple traditional information-sharing, although, as explained above, this too can be expanded. The goal, according to the U.S. Space Command, is to facilitate movement toward mission sharing.¹³⁶ Once the United States and its partners are properly aligned on policy, the mutual objective can be freedom of action in space, the establishment of norms for space behavior,¹³⁷ and, when necessary, the achievement of space superiority.

A Final Word

The Biden Administration will likely continue the excellent work of the National Space Commission and undertake its own evaluation of existing National Security Space Policy and Defense Space Strategy to ensure they reflect 21st century space realities. It should then use the opportunity of a newly published directive to publicize broadly the U.S. vision for space, a vision that speaks clearly and unambiguously to the U.S. interest in maintaining freedom of space in times of peace and war.

The Biden Administration also should make a concerted effort to persuade leaders throughout government, especially in Congress, of the merits of its vision and new policy. It must work to make that vision a reality by

¹³⁶ Hitchens, "Raymond Urges NATO Space Ops; Europeans Fear Offensive Missions."

¹³⁷ International understanding and agreement of what constitutes unsafe, irresponsible, or threatening behavior in space is nascent. See *Defense Space Strategy*, p. 4.

preparing the public mind (domestic and foreign) for the possible introduction of new Defense Department programs to compete in a space combat environment to address 21st century national security and military requirements.

All federal departments and agencies, and Congress need to be educated and enabled to carry out a new policy direction. The leadership may wish to establish a bipartisan task force on a path forward and to examine and make actionable recommendations to mature U.S. space policy and space activities. Whatever approach is taken, the adoption of a vision and a national security policy will invariably require a whole-of-government approach, and the National Space Council can help ensure that its success.

If the nation is to be ready to defend U.S. interests in space and use it effectively in the prosecution of a future war, there is a dire need to “streamline” or corral the execution of space policy, the development and execution of which currently falls within the purview of many offices within the U.S. Government. As General Raymond writes, “Our charge in the months and years ahead is to act boldly. In fact, one of the risks I see for the new Space Force is us not acting boldly enough.”¹³⁸ Indeed, the entire U.S. national security space enterprise will be at risk in the absence of a decision to proceed boldly.

¹³⁸ Raymond, “Space dominance requires taking technology and policy risks.”

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Michael Rühle, "The Problem with *Sole Purpose* and *No First Use*," No. 493, June 2021

