

ELECTRONIC COMBAT IN SPACE: EXAMINING THE LEGALITY
OF FIELDING A SPACE-BASED DISRUPTIVE
ELECTROMAGNETIC JAMMING
SYSTEM

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MASTER OF MILITARY ART AND SCIENCE
Military Space Applications

by

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

ELECTRONIC COMBAT IN SPACE: EXAMINING THE LEGALITY OF FIELDING A SPACE-BASED DISRUPTIVE ELECTROMAGNETIC JAMMING SYSTEM, by Major Kurt M. Schendzielos, 105 pages.

Significant debate surrounds the concept of “peaceful use of space” as delineated in various international treaties and espoused in the United States (US) Space Policy. The US view allows military space applications. One remaining frontier concerning military use of space is placing weapons in orbit. There is an ever-increasing desire to breach that frontier. Along with lasers and kinetic energy weapons, disruptive electromagnetic jamming (EM jamming) (under the auspices of electronic attack (EA)) is one topic deserving exploration.

Within that context, what are the legal limits concerning the fielding of a nonlethal Electronic Counter Measures capability in space? The potentially aggressive yet nonpersistent effect of EM jamming blurs the lines between military support and military weapons.

This thesis examines the various international and domestic treaties, laws, and policies to determine if restrictions to fielding EM jamming in space exist. Ancillary issues examine majority interpretation of “peaceful use,” what constitutes “space,” determining if EM jamming qualifies as a weapon, and whether all weapons are prohibited from being placed in space. Legal determination concerning fielding a space-based EM jamming system is a necessary step toward developing and employing such a capability for the US military.

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ACRONYMS

ABM	Anti-Ballistic Missile
ASAT	Anti-Satellite
CAUSNSSMO	Commission to Assess United States National Security Space Management and Organization
COPUOS	Committee on the Peaceful Uses of Outer Space
DoD	Department of Defense
EA	Electronic Attack
EM Jamming	Electromagnetic Jamming
GPS	Global Positioning System
ICBM	Intercontinental Ballistic Missile
IW	Information Warfare
JP	Joint Publication
NASA	National Air and Space Administration
SDI	Strategic Defense Initiative
UN	United Nations
US	United States
USAF	United States Air Force
USN	United States Navy
WMD	Weapons of Mass Destruction

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CHAPTER 1

INTRODUCTION

As we deal with the threats to peace and security from the proliferation of land based weapons, surely we need to think long and hard before creating potential space-based proliferation threats. (2006, 1)

Senator Christopher J. Dodd (Democrat Connecticut)

Background

Before the first man-made object began to orbit Earth, man dreamt of the use of space to achieve military aims. Space represents the ultimate high ground to hold targets below at risk. Military reliance upon space exploitation continues to deepen. Multiple technologies for use in space are explored and researched every day. Among the topics being explored is the use of electromagnetic jammers from space in order to provide effects against ground, air, and potentially space-based threat radars. The legality of such a move has not been thoroughly addressed to date.

Space Law Foundations

For the United States (US), serious investigation into military space utility began in 1946 with RAND Corporation's first study titled "Preliminary Design of an Experimental World-Circling Spaceship" (York 1986, 18). RAND scientists (then a part of the Douglas Aircraft Company) posited the use of space for military means and speculated the potential of basing weapons in space. The report concluded: "The military importance of establishing vehicles in satellite orbits arises largely from the circumstances that defenses against airborne attack are largely improving . . . the satellite itself can be considered [a] missile" (Ridenour 1990, 9-10).

Concurrent with the RAND study, the National Advisory Committee for Aeronautics continued research of high speed aircraft, gas turbine engines and even heat transfers due to re-entering Earth's atmosphere after extreme high altitude flight. This research was further focused into space applications in 1952 (Rumerman 2003). As America pushed upward toward the frontier of space, decisions about how to regulate the use of space began to be explored. The area of space proved to be problematic. Was space more like the open oceans or did it inherit the aspects of the airspace below it?

The first formal US space policy was published in 1955 (National Security Council 1955, 308). The basis of this space policy started with research conducted by the Surprise Attack Panel (renamed the Technological Capabilities Panel). In the final report, the panel recommended "that the United States develop satellites to operate at high altitudes. These satellites would establish as a principle of international law the freedom of passage for any subsequent military satellites" (Terrill 1999, 4). This served as the basis of what subsequently was coined the sanctuary doctrine of the Eisenhower administration, a doctrine that is still widely popular today. The basic tenet of the doctrine is that "space is for peaceful purposes and, therefore, is a sanctuary from warfare" (Rosenberg 1990, 118). President Eisenhower was not searching to keep space completely non-militarized, however. He aimed to protect the US from a surprise nuclear attack from the Soviet Union. "Eisenhower's space-for-peace policy was his resolve to prevent a nuclear Pearl Harbor" (Terrill 1990, 8). He advocated freedom of passage for space-based intelligence platforms. He clearly understood that this intelligence could be used for military uses, and therefore did not seek to keep military out of space, but was much more concerned with weaponization of space. "He perceived that [intelligence

gathering] satellites were passive not ‘offensive’ and argued that it was his intent that they be used to maintain peace” (Terrill 1990, 9). He hoped that the free passage of scientific satellites explained in his national space policy would set precedent for follow-on military intelligence satellites to have freedom of navigation over the Earth.

The launch of Sputnik I by the Soviet Union on 4 October 1957, established the freedom of navigation precedent and served as the basis for later treaties and space law.

No nation protested the orbiting of Sputnik over its territory, and the first freedom, the freedom of overflight, became established with that launch. The absence of any objection from other states meant that the orbiting of satellites around the Earth was not a privilege but a right given to all nations. It was evident from this auspicious beginning that flight through outer space would have more in common with voyages on the high seas than with aircraft flight. (DeSaussure 1992, 6)

The freedom of navigation concept originates from maritime law. *The Convention on the High Seas* treaty, drafted in 1958 and ratified in 1962, codified customary law by declaring, “The high seas being open to all nations, no State may validly purport to subject any part of them to its sovereignty” (United Nations 1962, 2). Enumerated in the same article are four principles of maritime law: “(1) freedom of navigation; (2) freedom of fishing; (3) freedom to lay submarine cables and pipelines; and (4) freedom to fly over the high seas” (United Nations 1962, 2). Principles one and four directly echo the reaction to the launch of Sputnik I. As the United Nations (UN) was ratifying maritime law, international space treaties were in development between contemporary space-faring nations.

Space law fundamentals are drawn from both maritime and aviation law of the early 20th century. Maritime law, however, has the most in common with the space treaties ratified by the UN. “All of the treaties, including the moon treaty, have drawn in

one way or another on certain principles of maritime law” (DeSaussure 1992, 5). Debate raged about how to apply the customary and established maritime law concerning use of weapons and use of force in the newly opened environment of space. The US continued to advocate its sanctuary doctrine toward space. Congress declared in the National Aeronautics Space Act, “it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind” (National Aeronautics Space Act 1958, 2).

Soon after the Sputnik launch, the UN General Assembly created the Ad-Hoc Committee on the Peaceful Uses of Outer Space (COPUOS) (United Nations 1958, 2). This committee became a permanent body in the UN in 1959 (United Nations 1959, 1). The charter of COPUOS was “To review, as appropriate, the area of international co-operation, and to study practical and feasible means for giving effect to programmes in the peaceful uses of outer space which could appropriately be undertaken under United Nations auspices” (United Nations 1959, 1). The General Assembly defined guiding principles for COPUOS. First and foremost, the *United Nations Charter* would apply.

The *United Nations Charter* expresses the peaceful nature of the UN in the first chapter:

To maintain international peace and security, and to that end: to take effective collective measures for the prevention and removal of threats to the peace, and for the suppression of acts of aggression or other breaches of the peace, and to bring about by peaceful means, and in conformity with the principles of justice and international law, adjustment or settlement of international disputes or situations which might lead to a breach of the peace. (United Nations 1947, 2)

This implication follows that force may be used to establish peace, a concept that is difficult to apply within space law. Does the placement of weapons in space in order to

deter, thereby establishing and maintaining peace, mesh with the UN view on peace? Vociferous debate continues to this day. This quandary is what COPUOS began with. One of the products created by COPUOS and adopted by the UN General Assembly in 1963 was the *Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space* (United Nations 1963, 1). This resolution became the bedrock for the first UN space treaty to be ratified, the *United Nations Treaty and Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, otherwise known as the Outer Space Treaty, which became enforceable in 1967 (DeSaussure 1992, 5). Four other treaties were subsequently drafted leading to five total space treaties, to date, regarding space (see table 1). Of these agreements, three pertain directly to the discussion of peaceful uses of space--the Outer Space Treaty, the Rescue Agreement, and the Moon Agreement. The US has not ratified, and does not recognize, the Moon Agreement (United Nations 2006, 15).

Within the UN treaties there is no clear definition of “peaceful use” of space. It is up to the interpretation of the various countries party to the treaties to agree and apply the principles as seen fit. There is a great deal of customary law and space-faring nation’s policies over the past fifty years continue to establish more customs. As a lead nation in space, the US *National Space Policy*, over the last fifty-one years, has set the tone for the customary application of the peaceful use of space. Even the most recently published *National Space Policy* reiterates a basic axiom of US space programs. “The United States is committed to the exploration and use of outer space by all nations for peaceful purposes, and for the benefit of all humanity. Consistent with this principle, ‘peaceful

purposes’ allow U.S. defense and intelligence-related activities in pursuit of national interests” (Presidential Directive 2006, 1).

Table 1. United Nations Space Treaties		
Treaty	Short Title	US Signatory?
United Nations Treaty and Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies	Outer Space Treaty of 1967	Yes
Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space	Rescue Agreement of 1968	Yes
Convention on International Liability for Damage Caused by Space Objects	Liability Convention of 1972	Yes
Convention on Registration of Objects Launched into Outer Space	Registration Convention of 1976	Yes
Agreement Governing the Activities of States on the Moon and Other Celestial Bodies	Moon Agreement of 1984	No

Source: United Nations, *UN Treaties and Principles on Outer Space* (New York: UN, October 2002), iii.

Space is certainly used for other than strictly peaceful purposes. A multitude of military satellite programs support the conduct of warfare. These range from the Global Positioning System (GPS) for navigation, weapon accuracy and time synchronization to the Defense Satellite Program for missile warning to the Defense Meteorological Satellite Program for weather forecasts to military forces (York 1986, 20).

Space-Based Jamming

In a 2002 USAF Weapons School Paper, Major Timothy Sands set about proving that it is technically feasible, within the laws of physics, to disrupt a ground-based electromagnetic signal (for example, a radar signal) using a space-based electronic attack

(EA) signal (for example, jamming from space) (Sands 2002, 11). This provides an added dimension to the weaponization of space debate. The contention usually involves a destructive application of space. That destructive effect could be from kinetic kill weapons like a nuclear warhead or a depleted uranium rod. Or, the destructive effect could be produced by directed energy weapons, specifically a laser (York 1986, 26). An EA can achieve both a disruptive and destructive effect. It is the disruptive aspect of EA that will be explored.

Thesis Question

Given that space-based EM jamming is technically feasible, do the current bodies of laws, treaties, and policies applicable to the US prohibit fielding a space-based disruptive EM jamming system? In order to answer the primary question, additional questions must be explored. First, what treaties, laws, and policies govern the US with regard to placing weapons in space? Do they limit, deny, or allow such a move? The next question is what is a weapon? Does EM jamming count as a weapon for reasonable interpretations, and more specifically, does EM jamming count as a weapon for treaty and law purposes? Next, what is implied and understood to be the peaceful use of space?

Operational Terms and Definitions

Because the nature of this discussion is centered around the US fielding an EA capability and that fielding will undoubtedly be under the control of the Department of Defense (DoD), it is appropriate to use the definitions proposed by that agency.

Electronic Attack

Department of Defense, Joint Publication (JP) 1-02 defines EA as:

That division of electronic warfare involving the use of electromagnetic energy, directed energy, or antiradiation weapons to attack personnel, facilities, or equipment with the intent of degrading, neutralizing, or destroying enemy combat capability and is considered a form of fires. Also called EA. EA includes: 1) actions taken to prevent or reduce an enemy's effective use of the electromagnetic spectrum, such as jamming and electromagnetic deception, and 2) employment of weapons that use either electromagnetic or directed energy as their primary destructive mechanism (lasers, radio frequency weapons, particle beams). (Department of Defense 2006, 177)

This definition is broadly encompassing adding the dimension of kinetic and directed energy weapons as an EA enabler. The definition of EM jamming is more appropriate to the discussion of this thesis.

Electromagnetic Jamming

The DoD, JP 1-02 and Air Force Doctrine Document 2-5-1 define EM jamming as: "the deliberate radiation, reradiation, or reflection of electromagnetic energy for the purpose of preventing or reducing an enemy's effective use of the electromagnetic spectrum, with the intent of degrading or neutralizing the enemy's combat capability" (Department of Defense 2006, 176; and Department of the Air Force 2002, 8). The classic example of EM jamming is to receive a radar signal, process it, and send it back in manner so as to completely deny information to the enemy radar (broad noise jamming) or to provide incorrect data back to the enemy radar (specialized techniques). Another example of EM jamming is the release of chaff to reflect the enemy radar signals, creating false tracks in order to hide the true location of the intended target.

EM jamming effects exist only as long as an EM jammer is radiating. If the source of the jamming is turned off, the affected enemy signal is restored immediately to normal working order. EM jamming effects are therefore temporary and reversible. There is no physical disablement of the affected signal.

Assumptions

The US currently faces a crisis in EA capabilities, specifically in the field of disruptive EM jamming. This crisis began in the 1990's when the United States Air Force (USAF) divested themselves almost entirely of EA assets as they retired the aging but capable EF-111A Raven and vaunted F-4G Phantom II Wild Weasel. All EA support missions were provided by the United States Navy (USN) employing the EA-6B Prowler. Eventually, the USAF converted several F-16s to the F-16CJ (block 50) adding a high speed antiradiation missile capability for the suppression of enemy air defense missions. Today, DoD is searching for a replacement to the aging EA-6B, which is predicted to be non-mission capable as a fleet in the near future. Several proposals have been explored, including the system-of-systems approach of the Advanced EA program. Several of the technologies Advanced EA was predicated upon have not panned out, and now the DoD is looking to heavily rely upon the USN program to upgrade several F/A-18F Hornet airframes to an F/A-18G Growler format to replace the EA-6B capability, maintaining EA and high speed antiradiation missile employment. These F/A-18Gs are projected to be few in number and as such, will remain a low-density, high-demand asset, rarely capable of completely filling all the needs for EA and suppression of enemy air defense in major theater war against a peer-competitor Integrated Air Defense System, much less against more than one peer Integrated Air Defense System.

New technologies being fielded for an air campaign will still require EM jamming in order to efficiently and safely accomplish required missions. The proliferation of cruise missiles does not reduce the need for EM jamming support to strike packages or to the missiles themselves. As cruise missile technology advances, so does surface-to-air

missile technology. The capability to shoot down a cruise missile is highly sought after and necessitates a viable EM jamming capability to potentially protect the missiles in future engagements. Additionally, advances in low-observable technology, more commonly referred to as “stealth,” do not obviate the need for an EM jamming capability. Only a small percentage of air platforms are low observable today. The capability to detect and nullify low-observable advantages is a field of great exploration for adversary nations and may increase the need for EM jamming support in the future. Lastly, the move toward unmanned aerial vehicles does not remove the requirement for EA support. Unmanned aerial vehicle systems are both tactically and strategically important. The DoD cannot afford to lose them, militarily or economically. The need for EM jamming will not diminish any time soon, and the proliferation of high tech systems and next generation defenses may potentially increase in the future, thereby increasing the need of EM jamming capabilities.

The technical feasibility of credible space-based EM jamming that is effective against ground and space targets is within US technical means. Previous research shows space-based EM jamming is theoretically feasible. Minus additional research, this thesis assumes that the technical capability exists today to field a system that can provide effective EM jamming against a range of ground-, air- or space-based targets. Additionally, it is assumed that there is no currently fielded EM jamming system in space. There is no unclassified or open-source data to suggest that such a system has been fielded by any nation.

An infrastructure exists today that could handle procuring, building, testing, launching, and maintaining a space-based EM jamming system (either dedicated

platforms or a capability added to other multitasked satellites). Additionally, the costs of a space-based EM jamming capability are within the means of the DoD and the net effect justifies the costs of fielding such a system.

Limitations

This thesis will discuss the policy implications of EM jamming from a space vehicle. It will explore the definitions of a weapon and a hostile act. It will examine if EM jamming meets the definition of a weapon or hostile act, and in doing so, if any legal or international agreement prohibitions are triggered. It will finally examine possible political prohibitions to fielding a space-based EM jamming capability.

This thesis will not discuss space-based electronic support or electronic protect (also known as electronic counter-countermeasures) fielding. It is assumed that these activities are not limited by any proclamation of the peaceful use of space in light of the current militarization of space precedent. The discussion is limited to EM jamming as a subset of EA. Because the DoD definition of EA includes kinetic and destructive means (for example, a cruise missile attack to destroy a surface-to-air missile radar), there are obvious aspects of EA that would clearly trigger the weapons in space limitation and debate. However, it is the nature of EM jamming, as a facet of EA, that is less clearly defined as a military tool and thusly requires more interpretation and research in the weapons in space discussion.

This thesis will not debate the pros and cons of weaponizing space. There is already a great deal of discussion regarding the merits of each side. It will focus upon the implications of fielding a space-based EA capability in light of current treaties, laws, and

policies. This discussion will not explore the legal implications of fielding kinetic weapon systems in space.

This thesis will not discuss any specific tactics or procedures tied to fielding an EM jamming system in space.

This thesis will not explore any classified information or data. There may be additional concerns and limits based upon classified documents. From a purely speculative view, this thesis addresses only the body of evidence in the international public domain, since it is in that arena that the consequences of the various laws and treaties will manifest themselves.

Significance of This Study

The 2006 National Space Policy declared one of the space policy goals to be: “Enable unhindered U.S. operations in and through space to defend our interests there” (United States President 2006, 2). A second goal stated in the policy is to “Enable a robust science and technology base supporting national security, homeland security, and civil space activities” (2006, 2). These two goals, taken together, could be construed to signal a significant shift in US policy toward the weaponization of space.

Space is already militarized. As adversary nations continue to develop space capability, the US must continue to look to defend the satellites based there. There could be a need to protect those satellites from a terrestrial-based attack or from an attack from another satellite. For this reason alone, defense policy makers continue to debate the reality of placing weapons in space. While this debate centers on destructive effects from space, the harder question to explore is disruptive effects from space. As the US military continues to search for more and more nonlethal effects on the ground, especially in the

Global War on Terrorism, nonlethal effects should simultaneously be explored in the air. Beginning that exploration, as soon as possible, will allow the US to maintain its lead in space activities and space technology and will also ensure a comfortable margin in maintaining the space superiority enjoyed by US forces today. Establishing the limitations and hurdles to fielding disruptive effects like EM jamming will open the door for many potential nonlethal space-based effects that may not trigger peaceful use of space provisions, or will usher in the nearly inevitable weaponization of space, just as airspace was weaponized in the early twentieth century.

Chapter Summary and Conclusion

Militarization of space has already occurred. Additional military applications of space are being researched every day. The debate over space-based weapons is increasing with renewed intensity. The feasibility of space-based EM jamming is theoretically feasible. There is a declared need for additional EM jamming platforms to adequately protect US forces. What must be explored are the treaty, law, and policy roadblocks that would prevent the fielding of a space-based EM jamming capability.

Chapter 2 of this thesis will present a review of the literature surrounding the debate of weaponization of space and describing the use of EM jamming in warfare. Chapter 3 will explain the methodology to be used to explore the research question. Chapter 4 will analyze the results of the research conducted. Chapter 5 will apply the results of the analysis to develop further recommendations for study and examination. First, however, an exploration of the major, relevant views regarding the space weaponization debate must be explored to have a foundational understanding of the implications of placing a weapon in space.

CHAPTER 2

LITERATURE REVIEW

As space activities have developed and expanded, so have the scope and substance of space law. National legal regulation of space activities began with the beginning of space activities, and international laws and regulations have expanded steadily since the adoption of the 1967 Outer Space Treaty. (1992, XVII-XVIII)

Nandasiri Jasentuliyana,
Space Law-Development and Scope. Introduction

Introduction

This chapter illustrates available literature associated with space-based weapons. Primarily, it will focus upon the principle research question: Given that space-based EM jamming is technically feasible, do the current bodies of laws, treaties, and policies applicable to the United States prohibit fielding a space-based disruptive EM jamming system? In order to obtain a fuller understanding of the primary question, secondary questions must also be explored and answered.

The first hurdle is to understand what qualifies as a weapon and what is meant by peaceful use. Delineating outer space from airspace and applying the various bodies of space law and air law is contentious. Once these terms are set, exploration of the basic tenets underpinning international treaties, international law, and customary international law can proceed. Reviewing the applicable treaties, laws,, and policies frames the answer to the primary question. Finally, a review of previous academic research concerning weaponization of space serves as a springboard for the analysis presented in this thesis.

What is a Weapon?

International Definition

There is no single, legal, standard definition for what constitutes a weapon in international law. Most authors, specifically those in the weaponization of space debate, contextually define their use of the term “weapon.” An implied contract exists with intended audiences that the use of weapon is universal enough to facilitate an effective debate. However, as will be discussed in chapter 4, that approach is fraught with problems.

Current international law literature identifies several parameters that would be illegal for a weapon. These restrictions are derived from several international treaties including: *The Declaration of St. Petersburg of 1868*; *The Hague Convention (IV) Respecting the Laws and Customs of War on Land, Annex to the Convention of 1907*; and *The Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects*. These precedents serve as the basis for the US military (and, for that matter, most of the world’s military’s) approach to creating legal weaponry.

United States Military Definition

The DoD does not have a single definition for a weapon. For the Department of the Air Force, which will most likely have the responsibility of a space control in the foreseeable future, the definition of a weapon is: “Weapons are devices designed to kill, injure, or disable people, or to damage or destroy property. Weapons do not include devices developed and used for training and practices; aircraft, intercontinental ballistic missiles, and other launch platforms; or electronic warfare devices” (Department of the

Air Force 1994, 1). The Department of the Army's definition mirrors the Air Force's. A weapon is defined as, "Chemical weapons and all conventional arms, munitions, materiel, instruments, mechanisms, or devices which have an intended effect of injuring, destroying, or disabling enemy personnel, materiel, or property" Department of the Army 1979, 1). The Air Force's definition explicitly states EM jamming is not a weapon, and by implication, not a weapon effect. The Army's definition is vague enough that an argument could be made that EM jamming is a device with the intended effect of disabling enemy materiel. What is lacking here is a time frame or a measure of reversal for the effect on the enemy materiel.

The RAND Corporation suggests four distinct classes of classic conventional weapons (see table 2) that could theoretically be employed in a space environment in one manner or another in the near term.

This list does not include space-based weapons of mass destruction (WMD) simply because of their clear prohibition in the Outer Space Treaty, which will be discussed in greater detail later in the thesis.

Table 2. RAND Corporation Classic Weapon Cases	
Directed Energy Weapons	Eg. Space Lasers. They use millions of watts of power and large optics to deliver a speed-of-light knockout punch as a missile arcs over Earth. Depending on the wavelength of the energy beamed out and atmospheric conditions, an energy beam can destroy a target on Earth's surface.
Kinetic-energy Weapons	Eg. Against missile targets. This hardware can ram headlong into a target in space or an object still within the upper reaches of Earth's atmosphere.
Space-Based Kinetic-energy Weapons	Slam into targets on the ground, such as large ships, tall buildings, and fuel tanks. Sleek and meteoroid-like in speed, these weapons attack targets at steep, nearly vertical trajectories.
Space-Based Conventional Weapons	Capable of maneuvering to hit terrestrial targets. These can carry and dispense rather exotic packages of destruction, such as radio-frequency or high-power-microwave munitions.

Source: David, Leonard, Space Weapons for Earth War, 15 May 2002, 2; available from http://www.space.com/business/technology/technology/space_war_020515-1.html; Internet; accessed on 12 April 2007.

What Constitutes the Peaceful Use of Space?

Peaceful use is a primary concept embodied in space law. There is no reference that defines what peaceful use is. The concept draws its contextual definition from the *Charter of the United Nations* (United Nations 1963, 2). Article I of the Charter explains the UN's purpose:

To maintain international peace and security, and to that end: to take effective collective measures for the prevention and removal of threats to the peace, and for the suppression of acts of aggression or other breaches of the peace, and to bring about by peaceful means, and in conformity with the principles of justice and international law, adjustment or settlement of international disputes or situations which might lead to a breach of the peace (United Nations 1949, 2).

States also retain the right of self-defense according to Article 51: "Nothing in the present Charter shall impair the inherent right of individual or collective self-defence if an armed

attack occurs against a Member of the UN, until the Security Council has taken measures necessary to maintain international peace and security” (United Nations 1947, 13). In application, a nation must be attacked without provocation in order to legitimize the use of force. “The only lawful use of force, besides collective action to enforce peace under U.N. auspices, is in individual or collective self-defense against ‘armed attack’” (Greenberg 1998, 83).

Where Does Outer Space Begin?

The definition of Outer Space remains a pending issue for space law. There are two major approaches to define the demarcation between air and space. These avenues are the distance (or height) approach (setting a static height above a common reference point on the surface of the Earth) and the functional (or characteristic) approach (setting a moving boundary based upon effects that only occur in the atmosphere of space). Either way, one agreed characteristic is that an object must be able to achieve and maintain an orbit without constant energy expenditure.

One example of the distance approach is: “the point of the lowest perigee of any artificial Earth satellite so far recorded” (Cheng 1997, 601). A problem with this definition is that some highly elliptical perigees dip well below what would sustain a circular near-Earth orbit. By using the lowest perigee recorded ever, an extremely high hypersonic vehicle could effectively be in space without ever achieving a viable orbit.

The DoD definition reflects a functional approach. The DoD defines “space” as: “A medium like the land, sea, and air within which military activities shall be conducted to achieve US national security objectives” (Department of Defense 2001, 492). It further defines the “space environment” as, “The region beginning at the lower boundary of the

Earth's ionosphere (approximately 50 km) and extending outward that contains solid particles (asteroids and meteoroids), energetic charged particles (ions, protons, electrons, etc.), and electromagnetic and ionizing radiation (x-rays, extreme ultraviolet, gamma rays, etc.)" (Department of Defense 2001, 493). This definition makes the boundary ever changing and would frustrate international identification of space-based activities within the treaties.

International Space Treaties and Laws

A concept that must be understood before reviewing various space treaties and laws is the difference between formalized law (through the process of ratifying treaties) and customary law. Treaties, such as the Outer Space Treaty, are formalized agreements and comprise the body of formal or classic international law. Formalized international law, in the guise of signed treaties, are only binding upon the signatories of the treaty and do not necessarily serve as de facto customary international law on all non-signatory nations. One example is the 1963 Test Ban Treaty, "with the International Court of Justice's decision rejecting the application of this Treaty to the French nuclear tests in the Pacific" (Polach 1991, 228). France had not signed or ratified the Limited Nuclear Test Ban Treaty, even though in 1998, they did enter into the Comprehensive Nuclear Test Ban Treaty well after these tests were conducted.

Customary international law is a collection of procedures and concepts that evolve over time. Most nations practice those procedures and concepts of their own volition. These "laws" become enforceable within the world courts and international organizations, such as the UN, even if they have never actually been formalized or

codified. Legal expert John Rhinelanders notes, “Therefore, it does not necessarily take a signed document to establish legal principles that are binding on countries” (1990, 5).

Customary Space Law

The Sputnik launch provides a good example of customary space law. “The U.S. and Soviet practice of freely conducting research and deploying various objects, including satellites, in outer space helped establish the freedom for such activities as parts of customary international law. This principle was further strengthened by the fact that no country protested those practices, to say nothing of trying to stop them” (Polach 1991, 228).

Some customary law does get written down, but does not become formalized in a treaty ratified by the requisite number of signatories. The early work of the United Nations Council on the Peaceful Use of Outer Space (COPUOS) is a good example. A series of early declarations came from this body prior to the drafting and ratification of the first formal space treaty. The UN General Assembly formally approved these declarations. As explained above, they do not carry the force of a ratified treaty, but they set clear expectations by which States are expected to act. The relevant declarations are listed in table 3. These declarations are the foundation documents that guided the framers of the various space treaties that followed from the UN.

Table 3. United Nations General Assembly Declarations		
Resolution Number	Resolution Title	Date Signed
1348 (XIII)	Question of the Peaceful Use of Outer Space	13 December 1958
1472 (XIV)	International Co-operation in the Peaceful Uses of Outer Space	12 December 1959
1721 (XVI)	International Co-operation in the Peaceful Uses of Outer Space	20 December 1961
1802 (XVII)	International Co-operation in the Peaceful Uses of Outer Space	14 December 1962
1884 (XVIII)	Question of General and Complete Disarmament	17 October 1963
1962 (XVIII)	Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space	13 December 1963
1963 (XVIII)	International Co-operation in the Peaceful Uses of Outer Space	13 December 1963

Resolution 1348 (XIII) formed the ad hoc COPUOS. COPUOS was charged with creating a report to the UN General Assembly concerning four topics: What resources the UN should devote toward securing the peaceful use of space, which contemporary international agreements and cooperatives that should fall under the auspices of the UN, recommended future organizations for international cooperation in the peaceful uses of space, what legal problems could arise from the exploration of space (United Nations 1958, 1-2). Resolution 1472 (XIV) permanently established COPUOS as a body that would serve the UN General Assembly in recommendations for the peaceful uses of space (United Nations 1959, 1-4). Resolution 1721 (XVI) divides the UN duties

associated with the World Meteorological Organization and the International Telecommunications Union (United Nations 1961, 1-4). Resolution 1802 (XVII) calls the nations to continue to endeavor in the creation of space laws. This document presents the first reference of the liability clauses, the rescue of astronauts, and the return of space property to the originating nation upon recovery on Earth (United Nations 1962, 1-4). Resolution 1884 (XVIII) requests member states agree to ban all WMD, specifically nuclear weapons, from being stationed in space or being employed in outer space and from outer space against the Earth (United Nations 1963a, 1). Resolution 1962 (XVIII) sets forth general principles for the peaceful use of space. These themes include the peaceful use of space and formal international space law, sovereignty issues concerning artificial Earth satellites and celestial bodies, conflict resolution methods for disagreements concerning space activities, liability issues in the case of an accident in space or involving space assets, and the political status of astronauts specifically in regard to their rescue (United Nations 1963b, 1-3). Resolution 1963 (XVIII) formally announces the desire to create a series of space treaties. COPOUS is delegated the task of drafting the agreements for ratification (United Nations 1963, 1-3).

Formal Space Law

In the realm of formalized international space law, there are five UN treaties concerning the use of outer space. These treaties are listed in table 4. One guiding principle that is universal for all five treaties is the declaration of the peaceful use of outer space, “Recognizing the common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes” (United Nations 2002, 3). Of these treaties the Rescue Agreement has no relevance to the topic because treaty in no

way addresses weapons in space or space warfare. The Moon Treaty has no formal legal force over the US who never ratified it and did not sign it. However, it is possible that most provisions of the Moon Treaty can serve as a basis to create customary law by which the US would be expected to abide in spirit. These treaties will be explored in depth in chapter 4 of this thesis.

Table 4. United Nations Space Treaties		
Treaty	Short Title	U.S. Signatory ?
United Nations Treaty and Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies	Outer Space Treaty of 1967	Yes
Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space	Rescue Agreement of 1968	Yes
Convention on International Liability for Damage Caused by Space Objects	Liability Convention of 1972	Yes
Convention on Registration of Objects Launched into Outer Space	Registration Convention of 1976	Yes
Agreement Governing the Activities of States on the Moon and Other Celestial Bodies	Moon Agreement of 1984	No

Source: United Nations, *UN Treaties and Principles on Outer Space* (New York: UN, October 2002), iii.

United States Space Law and Policy

Two primary documents express US space law. Those are the *National Aeronautics and Space Administration (NASA) Act of 1958* and the *National Space Policy of 2006 (NSP 06)*. At the military level, the *Report of the Commission to Assess United*

States National Security Space Management and Organization and Joint Doctrine Publication 3-14, *Joint Doctrine for Space Operations* delineate military space policy.

United States Government Law and Policy

The NASA Act serves as the foundation upon which the remaining domestic space law is built. The NASA Act converted the National Advisory Committee for Aeronautics into the current NASA organization. NASA is a civilian entity with an explicit working relationship to military space endeavors. The act assigns duties concerning domestic civilian and military space programs.

The *NSP 06* is a formal announcement of the current national policy concerning space. Several areas are addressed in the *NSP* including civil, commercial, and national security space policies. Issues such as trade, transportation, tourism, and capabilities are addressed. The US reaffirms a commitment to the use of space for peaceful purposes. However, *NSP 06* inspired controversy with a more aggressive tone and heavy emphasis concerning national security.

Department of Defense Policy

Joint Publication 3-14 explains the foundations of US space doctrine and establishes tactics, techniques, and procedures for military exploitation of space capabilities. The duties of various space agencies within the DoD are enumerated. The four space mission areas of Space Control, Space Support, Force Enhancement, and Force Application are addressed including the explanation of the capabilities to support those mission areas (Department of Defense 1999, 1-51).

The Report of the Commission to Assess United States National Security Space Management and Organization is an examination of the state of military space activities in 2001 and provides suggestions of where military space efforts should go in the future. The document affirms the US reliance upon space for various aspects of military and civil missions. The security of the US is directly tied to the capability to employ and freely utilize space assets. A survey is conducted that explains the various organizations in the national security space structure and assesses the management of military space endeavors. Several recommendations are presented including exploring a separate space corps, creating various under-secretary positions, coordinating efforts between disparate space agencies, and examining space budgeting procedures (Commission on National Security Space 2001, i-xxxv).

Previous Research Concerning EM Jamming From Space

Almost all the discussion previously conducted concerning the topic of space weaponization center around kinetic effects. These debates have limited to no applicability concerning EM jamming a target from space. The overwhelming majority of the debate centers on the question of placing a “traditional” weapon in space. The assumption is that a traditional weapon has a kinetic effect, one that is visible and is permanent. Most present arguments for or against placing a projectile (such as a missile) or a directed energy weapon (such as a laser) into orbit. Other than the identification of legal principles concerning the peaceful use of space, most of these arguments are, at best, tangential to the legality of EM jamming from space.

Books

A few key books examine the legal aspects of space weaponization in depth and in a manner that is applicable to the topic of space-based EM jamming. These books include *Weapons in Space*, *Space Law Development and Scope*, and *Building a Consensus Toward Space*. The obvious focus of most legal analysis concerning space is the placement of clearly offensive kinetic weapons, such as missiles or projectile rods into orbit. Technologies that have effects similar to weapons but are not what has traditionally or historically been considered a weapon are much more controversial to discuss and analyze.

Weapons in Space debates the feasibility and treaty implications of the announcement of the Strategic Defense Initiative in the mid-1980s. This analysis is very applicable to the idea of EM jamming from space because it focuses upon the defensive use of weapons, a clear parallel to the application of EM jamming. The authors conclude that the Outer Space Treaty would not prevent the fielding of an Strategic Defense Initiative (SDI) system, but the Anti-Ballistic Missile Treaty would be much more problematic. Other portions of the book explore the strategic implications of trying to mitigate Soviet nuclear capabilities (Chayes 1986, 1-214).

Space Law Development and Scope is a comprehensive examination of various space law issues. Historic foundations of space law including air and naval law tenets are traced. Space weaponization and space militarization issues are also explored. Unfortunately, as mentioned above, the authors chose to address traditional weapons, such as lasers and missiles. The analysis of various space treaties is of value to the subject of EM jamming legality (Jasentuliaya 1992 and Jankowitsch 1992).

Much like *Weapons in Space, Building a Consensus Toward Space* is written in the shadow of a Soviet nuclear threat and the announcement of the SDI program. This book focuses specifically upon the Outer Space Treaty and anti-ballistic missile (ABM) Treaty and then provides some cursory analysis of other space law and US federal statutes. This analysis also contextually concerns itself with kinetic weapons capability to defend against ballistic missile attack. The point of view about treaty applicability is of interest and serves as a basis for departure in order to examine EM jamming from a space platform (Rhinelander 1990, 1-220).

Theses

Several military professionals have examined the topic of weaponizing space in their research for the School of Advanced Air and Space Studies and for the School of Advanced Military Studies. The majority of these research projects focus upon the technical aspects of the viability of placing weapons on orbit, or just employing ground based weapons against targets in space. Additionally, most of the research conducted examines kinetic and directed energy weapons that leave lasting effects (for example, missiles and lasers). There is a lot of discussion about the doctrinal aspects of space military power as well. However, there is little talk about the legality of such moves, and there is even less discussion concerning the specific legality of EM jamming from orbit. Some of the discussions, however, do have relevance to the topic of this thesis and will be analyzed later.

Articles

There are a number of articles written since the early 1980s that take some sort of position concerning the militarization and weaponization of space. None of those articles specifically address the topic of EM jamming, however, there are several articles that come close in their discussion about the feasibility or need for directed energy weapons in space. None of the articles found addressed the treaty implications of fielding such weapons in space other than with a very superficial hand-wave. Several of the articles address the strategic and ethical concerns of making such an aggressive move as to weaponize space. In the end, none of the articles truly aided in the analysis of EM jamming from space, but they did serve to illustrate the depth and variance of emotions concerning the subject of space weaponization.

Chapter Summary and Conclusion

This chapter conducted a review of relevant topics concerning the deployment of space-based EM jamming. It began with a discussion of possible international and domestic definitions of what constitutes a weapon. While still muddled, it is worthy to note that most accepted definitions include some sort of effect that is tangible (for example, blast effects from a conventional general purpose warhead). With that concept explored, a discussion of peaceful use, as spelled out in the various space treaties and domestic law was discussed. There are still differences of opinion concerning the interpretation of peaceful use, however, a focus upon the interpretation of the US equating it to “non-aggressive” frames the relevant discussions for this research question. One other doctrinal exploration was conducted to address the boundary between air and space. This explanation frames the context in which to apply the international and

domestic laws concerning space-based EM jamming. A review of relevant international customary and formal law, including international treaties, set the stage for understanding of the legal environment concerning space-based EM jamming. Finally, a survey of relevant domestic law explored the policy and law constraints that are self-imposed upon the US military concerning the exploration, testing, and employment of space-based EM jamming.

Chapter 1 of this thesis introduced the fundamental concerns in the debate about weaponization of space and inquires about the problematic introduction of space-based EM jamming. Chapter 3 will explain the methodology used to explore the research question. Chapter 4 will analyze the results of the research conducted. Chapter 5 will apply the results of the analysis to develop further recommendations for study and examination.

CHAPTER 3

RESEARCH METHODOLOGY

In their efforts to shape future rules and policies affecting the further development and growth of space law, and in recognition of what Congress has aptly called the profound impact of science and technology on society and the importance of recognizing the interrelations of scientific, technological, economic, social, political, and institutional factors, both policymakers and legal technicians will need a multi-disciplinary understanding of a wide range of issues relating to advances in the various applications of space technology. Only then can it be hoped that the events accompanying these advances will take place with a minimum of friction both internationally and nationally (1992, 56).

Stephen Gorove, *Space Law-Development and Scope. Sources and Principles of Space Law*

Background

Research for this topic centered around the principle research question, Given that space-based EM jamming is technically feasible, do the current bodies of laws, treaties and policies applicable to the United States prohibit fielding a space-based disruptive EM jamming system? The topic was broken down into a series of questions that framed the order of research. (1) What are the current international space treaties and laws, and what are the applicable domestic space laws, and policies applicable to the US? (2) What is EM jamming? (3) What are the applicable legal definitions of weapon and peaceful use? and (4) What is the demarcation of where airspace ends and outer space begins?

Space Treaties, Laws, and Policies

The author began by determining the international treaties that affect military space application that the US was either a signatory of or otherwise bound. In order to be considered for this study, the author initially relied upon the explicit mention of

“military,” weapon or peaceful use in a given treaty. The search was expanded to include terms that may have periphery application to military use of space, such as the International Telecommunications Union statutes, by which military space communication satellites must comply. Determining the level of commitment that the US has to a given treaty, or more difficultly customary law, was problematic at times. The recent abrogation of the Anti-Ballistic Missile Treaty gives evidence to the temporary nature of signed treaties that are thirty-plus years old. For the purpose of this discussion, it was assumed that the US does not intend to abrogate any additional treaties in the foreseeable future. The author collected current versions of national space policy including the most recent doctrine documents from the DoD and branches of the military concerning space force application. Domestic laws were searched for applicable terms such as military, defense, weapon, and peaceful use. Additionally, any reference to a particular treaty, law, or policy in a debate about militarization or weaponization of space served as a means of selection for applicable data.

By surveying the applicable laws, the author was able to validate proposed secondary questions that would be essential to answering the primary question. The various treaties, laws, and policies created the boundaries within which the discussion about the primary question would take place. The author searched government databases and archives, UN websites, and conducted reviews of works on the subject ranging from previous theses and books to thematic articles.

EM jamming

The DoD definition of EM jamming was selected because any space-based jammer would be fielded by the DoD (vice NASA) and would be managed by the DoD.

The DoD definition is the jointly agreed upon definition, having been agreed upon by all military services, and it serves as the definition for the efforts of the services in that arena.

Legal Definitions

As discussed in chapter 2, determining the most appropriate definition for several of the concepts written into the treaties, laws, and policies is very difficult. Terms that are of specific focus for this discussion are peaceful use or peaceful purposes and weapon. While there are no explicit explanations defining these terms, there are common viewpoints and contextual usages of these terms that dominate the literature. The author sampled the literature in order to discern the international majority view of the contextual usage for these terms. This approach is problematic given that the second largest space-faring nation, Russia, has very different definitions of these terms for political reasons than the US does, as do many other space-faring nations. It is very tempting to take the American, or even western view, exclusively for these definitions; however, it is within the international court of public opinion that this argument will be resolved. The US cannot single-handedly enforce its interpretation upon the rest of the nations involved without potential consequences.

In cases where the concept can be validated based upon empirical actions of the nations, that tact was taken. For example, the concept that a satellite is free to circumnavigate the globe without hindrance was not formalized but went unchallenged by the rest of the world when they did not protest the flight of Sputnik. An airplane flight on the same trajectory but at a lower altitude would be illegal. The satellite orbit was not questioned. More clearly, the minority view that space should not include any

militarization whatsoever in order to be “peaceful” has clearly been ignored. Most space-faring nations implicitly approved of some level of space militarization by their absence of political objections when placing military navigation satellites like GPS and Glonass on orbit.

Outer Space Demarcation

For the purposes of discussion, it is important to differentiate where space begins. As aircraft capabilities continue to improve, and technologies like the hypersonic bomber or long-range strike concept evolve, the employment of “air breathing” assets moves ever higher and higher. It is feasible that within the next thirty years that hypersonic unmanned aerial vehicle could be operating at near-space or temporarily in space, similar to the way that Intercontinental Ballistic Missiles (ICBM) do today, only potentially for a much longer duration at apogee. By creating a demarcation line between space and airspace, the analysis here gains validity. It also becomes applicable for more than what is in the vision of today. It becomes applicable for the technological solutions of tomorrow. Therefore, establishing a demarcation section for Outer Space is crucial to this discussion.

For the purposes of this research, a similar approach was taken as was noted above for legal definitions of terms. The author surveyed applicable data concerning the views on space demarcation and selected the most prevalent contextual definition.

Analysis

The author will evaluate the primary research question utilizing a five-tiered approach: (1) Is the EM jamming space-based? (2) Is the EM jamming a weapon? If it is

a weapon, is it deemed offensive or defensive in nature? (3) Are there any legal restrictions that prohibit fielding the system in space? And (4) Are there any political prohibitions to fielding the system? Further explanation of the evaluation criteria follows. A graphic representation of the approach is shown in figure 1.

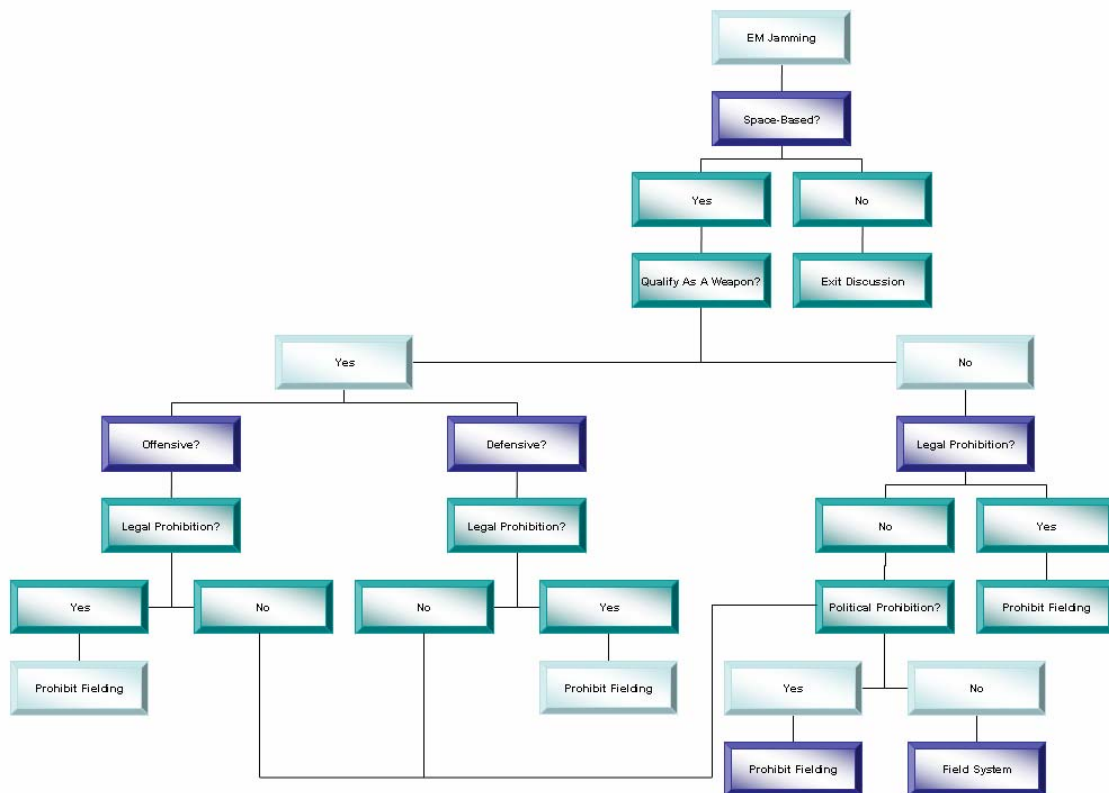


Figure 1. Analytical Methodology

Space-Based

The definition for space demarcation that was selected, as explained above, serves as the first evaluation criteria that would be applied. If a proposed EM jamming system does not meet the space demarcation, then the rest of the matrix becomes irrelevant, and applicable aviation statutes would then apply.

Weapon Qualification

The definition for weapon that was selected, as explained above, serves as the second evaluation criteria that would apply. Weaponization of space is one of the last remaining steps in the full militarization of space. If an EM jamming system is not deemed to be a weapon, approval, implicit or otherwise, is much easier to obtain. If an EM jamming system is deemed to be a weapon, then many more restrictions apply (to include the law of armed conflict).

Once declared a weapon system, the determination must be made if it is viewed as an offensive weapon or a defensive weapon. Offensive weapons are much more abhorrent to the international community and would trigger many more treaty restrictions. Defensive weapons are more palatable and may avoid some of the treaty restrictions that an offensive system would otherwise trigger.

Legal Prohibition

The concept of legal prohibition includes any explicitly written provision in domestic law or policy as well as any explicitly written or implicitly established customary international law. If ignoring a given stipulation creates conditions for the US to be in material breach of the provision or would induce unacceptable consequences due

to non-compliance, the weapon system would be prohibited. It is assumed for the purposes of this discussion that the US will remain party to the current body of space treaties and that it is not looking to change domestic space law in the foreseeable future just to be able to field a space-based EM jamming system.

Political Prohibition

The concept of political prohibition encompasses a survey of space policy decisions and opinions concerning the weaponization of space. While the action of placing an EM jamming system in space may not constitute a material breach of a treaty, it may still cause unacceptable political fallout. Trading partners may embargo US goods in response to fielding an EM jamming system in space. If that is determined to be a likely scenario, then that would serve as a political prohibition. Additionally, if the US Congress would not likely fund an EM jamming system in space because of political sensitivities, that would also serve as a political prohibition. Opinions expressed in contemporary literature serves as the basis for determining this prohibition.

Chapter Summary and Conclusion

This chapter explained the research methodology used for this thesis and explained the tool to be used to analyze the research obtained by the author in order to answer the primary research question. The fields of research included applicable space treaties and laws, EM jamming explanation, legal definitions for weapon and peaceful use, and demarcation of space. The method to analyze the research included determining if the system is space-based, if the system is characterized as a weapon and if so, is it

offensive or defensive in nature, if there are legal or political prohibitions that would prevent an EM jamming system to be placed into orbit.

Chapter 1 of this thesis introduced the fundamental concerns in the debate about weaponization of space and inquires about the problematic introduction of space-based EM jamming. Chapter 2 provided a review of the current literature concerning this topic. Chapter 4 will analyze the results of the research conducted. Chapter 5 will apply the results of the analysis to develop further recommendations for study and examination.

CHAPTER 4

ANALYSIS AND CONCLUSION

As for the idea of any treaty preventing the deployment of weapons into space . . . well, tell that to North Korea and Iran--nations undeterred by the likes of the Nuclear Non-Proliferation Treaty. (2006, 2)

Peter Brookes, "Militarizing Space"

Introduction

This chapter evaluates potential legal and political issues concerning space-based EM jamming. The principle research question is: Given that space-based EM jamming is technically feasible, do the current bodies of laws, treaties and policies applicable to the United States prohibit fielding a space-based disruptive EM jamming system? Complete exploration of the primary question using the analysis framework presented in chapter 3, necessitates secondary questions to be explored and answered. What exactly constitutes a weapon? Commensurate with defining what can be considered as a weapon. what differentiates outer space from airspace in order to ensure the proper examination of applicable space law? Once these questions are answered, an analysis of the various international treaties, international law and customary international law can then be conducted. These results answer the primary question.

Is the System Space-Based?

Given the two basic approaches to defining a limit of where space begins, the distance approach and the functional approach (see chapter 2 for more discussion), the distance approach is more tangible but it also allows for more controversy. The functional approach allows for easier consensus upon but it is unfortunately less tangible. Neither

approach serves as the most appropriate legal definition for what constitutes “space-based” EM jamming.

A mix between the two approaches warrants examination. For the purposes of this analysis, a functional distance is based, in part, upon the requirements set forth in the Registration Convention. Article II explains that, “When a space object is launched into Earth orbit or beyond, the launching State shall register the space object by means of an entry in an appropriate registry which it shall maintain” (United Nations 1975, 2). The implication is that objects that do not complete at least one circular orbit, such as ballistic missiles, would be excluded as space objects. A further requirement set forth in the Registration Convention Article IV stipulates that, “Each State of registry shall furnish . . . the following information concerning each space object carried on its registry: (a) Name of Launching State or States; (b) An appropriate designator of the space object or its registration number; (c) Date and territory or location of launch; (d) Basic orbital parameters, including (i) Nodal period, (ii) Inclination, (iii) Apogee, (iv) Perigee; (f) General functions of the space object” (United Nations 1975, 2-3). Again, this would exclude objects, like a ballistic missile, because most of these parameters are undefined.

Setting a boundary defining space at the lowest declared perigee on record in the UN registry for space objects achieves a tangible result that most likely will remain static for long periods of time. It can still be moved as more objects are placed in space, but it will not change dramatically over long periods of time.

This definition is not devoid of controversy. One concern is the lowest perigee of a declared object may very well be from a highly elliptical satellite and would create a distance far below what would be needed for a viable low-Earth circular orbit. However,

this definition serves as the most useful for further discussion upon the primary topic of space-based EM jamming. By basing the requirements upon the already agreed upon stipulations of the Registry Convention, most contrary interpretations are hard to defend.

The demarcation line for “space-based” is only of concern when attempting to categorize systems that exploit the margins of the definition. Except for some very specific examples of hypersonic vehicles orbiting for a couple hours, which may or may not have military value in the EM jamming realm, the concept of space-based EM jamming is envisioned to be employed aboard space platforms that will be orbiting the Earth for several years. Given this analysis, all systems envisioned met the first standard for being space-based.

For the purposes of this discussion, all hypersonic vehicles that might complete a full circuit around the Earth above the lowest registered perigee of any traditional satellite will qualify as being space-based, regardless of the time spent in orbit. Inability of completing a full circuit (like an ICBM) or operations below the lowest perigee is not space-based.

Is the System a Weapon?

The discussion concerning weapons in space is replete with contextual definitions; therefore, finding a clear consensus for the meaning of the term weapon is extremely difficult. In many ways it is much like the famous comment from Supreme Court Justice Potter Stewart when trying to define obscenity and “hard-core” pornography, “I shall not today attempt to further define the kinds of material to be embraced within that shorthand description; and perhaps I could never succeed in intelligibly doing so. But I know it when I see it” (Jacobellis 1964, 9). In the space

weaponization debate, Stewart's observation holds true. No single, clear definition is articulated in the space treaties, but it is assumed the audience understands what each proponent or opponent contextually defines as a weapon when discussing the placement of weapons in space. They know a weapon when they see one.

Weaponization of space is most often used in contrast to militarization of space. "“Space militarization is okay,’ one Democratic staff member said. ‘But with weaponization, my guys have a problem with that . . . there are all sorts of nuances there and [lawmakers] haven’t thought about it” (Ratnam 2006, 1-47). Author Tim Sands explained the theory of many strategists justifying the weaponization of space, “Space weapons [GPS guided] already exist today, so a very strong argument could be made that the weaponization of space has already occurred” (2001, 13).

Confusion increases when shifting away from more classic views of a weapon. An Air University study explored Information Warfare (IW) in support of space forces. IW included Electronic Warfare and thusly counted as a space weapon for the study in much the same way that GPS-guided weapons counted as space weapons. Within the study a munition dropped by aircraft while utilizing space-based signals for guidance is clearly a weapon but only loosely interpreted to be “space.” Additionally, IW conducted via satellite links was clearly space-based but can only marginally be construed as a weapon. According to Major General Harry Raduege Jr., Director, Defense Information Systems Agency, and Manager, National Communications System at the time, ““Since these are not guns or bullets, by our definition they are not space weapons. Thus, IW (which includes electronic warfare) does not weaponize space”” (Sands 2001, 14).

Julie Dahlitz of the UN Institute of Disarmament Research explores the problems associated with a single definition for weapons in space. She explains,

Prohibition of the use or the threat of force in outer space has been proposed, without elucidating what constitutes “force” in that environment. “Rules of the road” have been proposed, without explaining how this could prevent eventual confrontation in the face of deployment of overt weapons. Restriction of weaponization to “defensive” weapons has been suggested, without any credible method for differentiating between “defensive” and “offensive” weapons. (Dahlitz 1988, 109)

She further explains the difficulty in creating an appropriate definition for any weapon.

“Although a man can be killed with a bottle,” Dahlitz emphasized, “it is not necessary to regard bottles as weapons. The principle has relevance in outer space concerning, for instance, existing ballistic missiles which, while they could be targeted into outer space, are not efficient weapons so used” (1988, 111).

One gambit used to define the boundaries in the weaponization of space debate is to separate the use of space into military and civilian use. Military use is characterized as aggressive and civil use as non-aggressive. Unfortunately, much like weapon, none of the four terms are defined. This leads to what Mrs. Eilene Galloway explains is problematic with that approach:

A satellite capable of launching nuclear bombs could obviously be termed “aggressive,” but certain other types of space vehicle could be described as either “aggressive” or “non-aggressive,” depending on the viewpoint of the observers. One example is that of a communications satellite used for purposes of psychological warfare on a global scale: this might be considered as “non-aggressive” by the launching nation, but might be regarded as “aggressive” by the governments against which it was aimed. (Haley 1963, 155)

William Spacy adds, “The problem with attempts to limit space-based weapons to those that are defensive in nature is that most space-based weapons--like most other weapons--are difficult to categorize” (1998, 89).

While no articulated parameters define a weapon, there are standards for what makes objects illegal to use as a weapon. The first such standard appears in *The Declaration of St. Petersburg of 1868*. In the Declaration's preamble there are explanations about how war should be conducted, which lays the foundation for future international understandings of what constitutes legal and illegal weapons:

The only legitimate object which states should endeavor to accomplish during war is to weaken the military force of the enemy. . . . For this purpose, it is sufficient to disable the greatest possible number of men. . . . This object would be exceeded by the employment of arms which needlessly aggravate the sufferings of disabled men, or render their death inevitable. . . . The employment of such arms would, therefore, be contrary to the laws of humanity. (Reisman 1994, 35)

The Declaration further states that, "The contracting parties engage, mutually, to renounce, in case of war among themselves, the employment, by their military or naval forces any projectile of less weight than 400 grammes, which is explosive, or is charged with fulminating or inflammable substances" (Reisma 1994, 48).

Article 23 of the *Hague Convention (IV) Respecting the Laws and Customs of War on Land, Annex to the Convention of 1907* further defines what cannot be used as a weapon: "In addition to the prohibitions provided by special Conventions, it is especially forbidden: To employ poison or poisoned weapons;" and "To employ arms, projectiles, or material calculated to cause unnecessary suffering" (Reisman 1994, 47). The Hague Declaration (IV, 3) Concerning Expanding Bullets explains that, "The Contracting Parties agree to abstain from the use of bullets which expand or flatten easily in the human body, such as bullets with a hard envelope which does not entirely cover the core, or is pierced with incisions" (Reisman 1994, 49).

The UN added further restrictions to the types of weapons that are legal in the *Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons*

Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects signed in 1980. Several protocols were introduced in the Convention. These protocols include a ban on Non-Detectable Fragments; restrictions on the use of Mines, Booby Traps, and Other Devices; prohibitions on certain types of Mines, Booby Traps, and Other Devices; and place restrictions on the use of Incendiary Weapons (Reisman 1994, 50-54). Of note is a specific concept expressed within Protocol II on Prohibitions or Restrictions on the Use of Mines, Booby Traps, and Other Devices. Article III of this Protocol explains that:

The indiscriminate use of weapons to which this Article applies is prohibited. Indiscriminate use is any placement of such weapons: (a) Which is not on, or directed against, a military objective; or (b) Which employs a method or means of delivery which cannot be directed at a specific military objective; or (c) Which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated. (Reisman 1994, 51)

Chemical and biological weapons are specifically prohibited from future conflict in a series of declarations and conventions from the UN. There have been several recommendations from the UN General Assembly to also prohibit the use of nuclear weapons, however, to date; no formal treaty restriction exists to prevent the use of nuclear weapons (Reisman 1994, 57-67).

In the end, a process of elimination is required to deem a weapon legal. If not specifically banned in a treaty, then anything is de facto legal for use in combat. EM jamming is substantively different from kinetic weapons. The duration of the effect is reversible and of limited duration. The implication is that a distinction exists between kinetic weapons and nonlethal weapons. A congressional staffer agrees, “What about moving today’s ground-based communications jammers into space? ‘It is not an

application of force if it's temporary and reversible,' but is that a weapon, the aide asked" (Ratnam 2006, 1-47).

Within the class of nonlethal weapons, there are clear distinctions between a microwave sound emitter focused to disperse riots and EM jamming designed to prevent the use of surface-to-air missile radar. Sands explores this concept in the subtext of EM jamming:

A space weapon is defined by its offensive nature and intent to cause harm. By either logic, we have already weaponized space with our GPS guided bombs and missiles. There have also been weapon platforms put directly into orbit. The Soviet Union orbited a Fractional Orbital Bombardment System (FOBS) designed to drop nuclear bombs on America from orbit. Additionally, the United States deployed an anti-satellite [ASAT] weapon system (Program 437) for 10 years in 1965. Arguing the strong case in favor of [Joint Space-Based Electronic Warfare System], Electronic Warfare is not even considered a space weapon. Arguing the devil's advocate position against JSBEWS, the strictest interpretation would include EW as a space weapon. But, since it lacks the offensive nature of pre-existing space weapons, customary law would allow space-based electronic warfare even under this devil's advocate position. (Sands 2001, 14)

Lucy Stojak adds, "Although the FOBS system was tested extensively, no violation of article IV of the Outer Space Treaty occurred, since no nuclear warheads were ever used atop the missiles" (2002, 12).

Based upon the specific exclusion within the Air Force definition, EM jamming devices are not considered weapons. They may produce some temporary effects similar to a weapon but EM jamming is not categorized, and therefore not banned, by any current convention or international customary law involving the proper conduct of war.

Because EM jamming does not meet the standards for a weapon, the secondary standard of this tier requiring a distinction between being classified as offensive versus defensive became irrelevant. This allowed the analysis to continue on to the third tier of Legal Prohibitions. If the international community should enact different standards for

what is or is not a weapon, then further examination would have to take place to examine the differences between offensive and defensive weaponry and the distinct legal standards associated with each.

Is There a Legal Prohibition?

Several areas of space law have to be considered to fully analyze this tier. Several previous attempts to justify weaponization of space have chosen to focus primarily upon the Outer Space Treaty and the Anti-Ballistic Missile Treaty. For this analysis, the peaceful use concept became the primary standard that all other legal restrictions would be based upon. If the peaceful use standard can be satisfied, even marginally, then the actual texts of the various international and domestic laws can be examined. The analysis broke into three categories, international formal law, international customary law, and domestic formal law.

Peaceful Use Standard

While there is no direct explanation of peaceful use in the literature, the underlying concept is embedded throughout outer space law, including the Outer Space Treaty. The ambiguity surrounding peaceful use is deliberate. According to Abram Chayes, Antonia Handler Chayes, and Eliot Spitzer, the growing arsenal of ICBMs necessitated a blurred interpretation of peaceful use. “A major portion of the trajectory of such missiles (ICBMs) is in outer space, but they do not go into orbit. The language . . . was carefully chosen to ensure that the general principle of ‘peaceful uses’ would not interfere with the testing of these weapons” (Chayes 1986, 196). There is another, more profound, explanation for the intentionally vague definitions. Because the treaties are

“products of often difficult negotiations and necessary compromises, which result in many ambiguities, the remark . . . that the [Outer Space Treaty] ‘leaves much to interpretation by the parties’ . . . is also applicable to the other treaties” (Lissitzyn 1981, 414).

Imprecise definitions have been a constant source of consternation. As with the definition of weapon, there are multiple interpretations for what meets peaceful use. The US interpretation is, “‘peaceful’ merely means ‘non-aggressive,’ not necessarily ‘non-military’” (Rosas 1983, 359). The terms “aggressive” and “defensive” are vague and problematic. The *2006 United States National Space Policy* expands the interpretation of peaceful use: “The United States is committed to the exploration and use of outer space by all nations for peaceful purposes, and for the benefit of all humanity. Consistent with this principle, ‘peaceful purposes’ allow U.S. defense and intelligence-related activities in pursuit of national interests” (NSPD 48 2006, 1).

Some experts argue that, “Military space can also be classified according to their ‘aggressive’ nature. Extremes are on the one hand satellites used for the verification of disarmament and on the other hand space-based bombs and missiles targeted on Earth” (Rosas 1983, 357). Other experts have attempted to restrict space to defensive weapons, alluding to the non-aggressive interpretation favored by the US; however, this is still problematic. “Restrictions of weaponization to ‘defensive’ weapons has been suggested, without any credible method for differentiating between ‘defensive’ and ‘offensive’ weapons” (Dahlitz 1988, 109). Spacy further explains, “The vagueness with which ‘peaceful purposes’ is defined has prompted considerable discussion of its meaning. Interpretation ranges from banning any type of weapon whatsoever, to permitting purely

defensive weapons to be deployed. None of the interpretations would permit the deployment of offensive weapons in space” (1998, 89). Spacy further explains that defensive antimissile systems, by design, certainly have enough aspects that could be used offensively, in a first-strike manner, and thusly would have to be considered offensive in nature, regardless of the primary mission of the system.

Opponents to the US’ view that non-aggressive equals peaceful use prefer to equate peaceful with “non-military.” The latter view rings a chord among international jurists. “Among the most weighty points they make is that in practice it is difficult to differentiate aggressive from non-aggressive military activities. Thus, under the pretext of deterring aggression, weapons could be placed, and military operations mounted, even on the moon and other celestial bodies” (Polach 1991, 228). Because it is extremely difficult to clearly identify a satellite’s “aggressive” capability, they prefer to be conservative and restrict all military access to space in order to be sure. US policy defends a non-aggressive interpretation of peaceful use as evidenced by recent votes in the UN.

A number of nations have pushed for talks to ban space weapons, and the United States has long been one of a handful of nations opposed to the idea. Although it had abstained in the past when proposals to ban space weapons came up in the United Nations, last October the United States voted for the first time against a call for negotiations--the only “no” against 160 “yes” votes. (Kaufman 2006, 3)

Because the term peaceful use is a concept created by the founders of the UN, it is most appropriate to apply the ideals extolled in the UN Charter. The Charter clearly envisions a world where peace reigns supreme; however, it also realistically identifies that militaries must exist and that all nations must have both the capability to defend their sovereignty and must also retain the capability to enforce peace upon agents that violate that security. Given that context, peaceful use implies that militarization of space is

acceptable. Empirically this is supported by the general acceptance of military navigation, reconnaissance and communication satellites that populate the reaches of outer space today. Therefore the current US view of non-aggressive is a valid point of view and will be used for this discussion.

EM jamming, unfortunately, is not easily interpreted as non-aggressive. EM jamming does not meet the threshold of a weapon by most views. With the current technology available for space-based EM jamming the effective radiated power could not do more than temporarily deny effective exploitation of a portion of the EM spectrum by the ground element being countered.

A physical and irreversible effect would cease to be EM jamming and would be more appropriately defined as a directed energy weapon. Since EM jamming does not qualify as a weapon, arguably, by contextual definition, it can not be aggressive. It can be defensive and have effect, but should be interpreted as non-aggressive.

Of note, however, EM jamming is considered a “hostile act” and can be interpreted as an act of war if used during peacetime. EM jamming represents a violation of a nation’s sovereignty if they are not able to freely utilize the EM Spectrum within legal guidelines. However, an air platform that has the capacity of EM jamming but does not utilize that capacity can traverse national airspace with approval and international airspace freely. Ships are able to traverse the sea and even berth in foreign ports with EM jamming capability without impedance.

In that vein, it is understandable that a nation may be weary of a satellite with the capacity to employ EM jamming against their systems orbiting overhead; but, since there is implied approval for overflight of all satellites, the same argument should apply to

satellites as to air and sea platforms. As long as EM jamming is not employed to deny a country the use of their EM spectrum during a state of peace, then the mere presence of the satellite with that capability overhead should not materially represent a hostile or aggressive act. It therefore falls upon the country that placed the platform in space to act within the boundaries of legal use of the EM jamming or face the consequences of violating international laws of armed conflict.

This stance, of course, will invite criticism. It is part of a slippery slope that enables increasingly aggressive militarization of space. At first glance, navigation assets seem to be non-aggressive. However, when one considers that their application is clearly to enable a weapons platform and associated weapon to accurately destroy targets during the conduct of war, what seemed initially within the bounds of peaceful use takes on a decidedly ominous tone. EM jamming capability is a short step from directed energy weapons conceptually. When struggling to define legal precepts of what is peaceful use of space, it is a step that is certainly worrisome. A line must be drawn somewhere, perhaps that line is drawn right after EM jamming is fielded. The evidence and analysis lead to the conclusion that EM jamming is within the bounds of peaceful use. Given that standard, the next hurdle is international formal law.

Formal International Law Analysis

In 1992, noted space law expert Nandasiri Jasentuliyana explained how space law is different from other disciplines; “The large and growing body of space and space-related law described in this volume demonstrates that space law can now be considered a distinct and mature discipline of international law, comparable to maritime law and air law” (1992, XVIII).

William Spacy explains, “Aside from weapons of mass destruction, the treaty implications of deploying orbital weapons are somewhat vague” (1998, 88). This certainly turns out to be even truer when examining a new application of EM jamming in the context of IW and adding the complication of basing it in outer space. Historic discussions focused exclusively upon kinetic weapons. Early discussions centered about nuclear weapons on orbit and various projectiles to disable or destroy inbound ICBMs. There was no talk of the various “nonlethal” or “non-kinetic” technologies that are much more prevalent today. Jankowitsch observed in 1992 that, “Prospective or potential military space technologies that have been the subject of research or development include anti-satellite weapons, anti-ballistic missile weapons and space-based nuclear weapons” (1992, 144).

The language of laws is vitally important. It delineates the concept of adhering to the letter of the law vice the spirit of the law. Author Bruce Deblois explains: “One literal interpretation of international law, and perhaps the preponderant interpretation, is that whatever is not explicitly forbidden is implicitly (and perhaps deliberately) allowed” (2003, 48). This is an important concept. It is the basis of adjudication most often used when applying formal international law. It is, therefore, the standard that was used in this analysis. If the placing of an EM jamming system in space is not explicitly banned, then it is de facto allowed.

The UN Charter

While the US is bound to all provisions of the UN charter as a member nation, only certain portions of the charter play a role in the analysis of space weaponization. The Outer Space Treaty specifies that the *UN Charter* is applicable.

Article 2, section 4, is the first portion, stating that, “All Members shall refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any state, or in any other manner inconsistent with the Purposes of the UN” (United Nations 1949, 2). Lucy Stojak explains the controversy surrounding this article in her report, *The Non-Weaponization of Outer Space*, which was prepared for the International Security Research and Outreach Programme in Canada. Stojak wrote; “Whether this blanket prohibition of force or threat of force implies that any plans to introduce weapons into outer space would in itself be considered a threat of force, and whether it also prohibits the deployment of weapons directed from space to targets on earth are open to questions” (2002, 7). Peter Jankowitsch suggests that this provision of the Charter, “presumably applies to outer space as to any other area, and therefore any aggressive action by one state against the satellites or space objects of another is prohibited” (1992, 145).

Article 51 of the Charter also has direct application to space weaponization.

Article 51 reads as follows:

Nothing in the present Charter shall impair the inherent right of individual or collective self defence if an armed attack occurs against a Member of the UN, until the Security Council has taken measures necessary to maintain international peace and security. Measures taken by Members in the exercise of this right of self-defence shall be immediately reported to the Security Council and shall not in any way affect the authority and responsibility of the Security Council under the present Charter to take at any time such action as it deems necessary in order to maintain or restore international peace and security. (United Nations 1949, 13)

Jankowitsch explains that:

Some views of that right say that in the shadow of a presumed threat of attack this article allows a state to take preventative actions to defend themselves, including the placing of weapons in space. Others argue that the use of force would only be legal in response to armed attack and cannot be used as an excuse

for a preemptive action in order to prevent escalating arms races (Nandasiri Jasentuliyana, as quoted in Jankowitsch 1992, 146).

The Commission to Assess United States National Security Space Management and Organization (CAUSNSSMO) expressed the American view of the UN Charter interpretations. “It is important to note, however, that by specifically extending the principles of the U.N. Charter to space, the Outer Space Treaty (Article III) provides for the right of individual and collective self-defense, including “anticipatory self-defense.” In addition, the non-interference principle established by space law treaties would be suspended among belligerents during a state of hostilities” (Commission to Assess 2001, 37).

In light of the charter, there is nothing that directly prohibits the basing of weapons in space. Some of the narrow interpretations that attempt to deny any weaponization of space under the guise of the UN Charter must also eliminate weapons from other realms, such as the air and sea, much less upon land. Obviously that is an idealistic view but it is not very realistic. Therefore, within the confines of the text of the UN Charter, there is nothing that would stand as a legal prohibition to basing weapons in space.

The Outer Space Treaty of 1967

The Outer Space Treaty of 1967 addresses several types of activity in outer space, but a few key points are germane to the discussion here. The Treaty specifically prohibits the use of WMD in Article IV: “States Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of

weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner” (United Nations 2002, 4).

Article IV also specifically prohibits the “establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial bodies” (United Nations 2002, 4). Lastly, Article VI explains that, “States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in this Treaty” (United Nations 2002, 5).

The Outer Space Treaty of 1967 does not specifically prohibit weapons in space nor does it prohibit military activity in space. The charter is specific that no nation can field any weapon nor conduct any military actions upon celestial bodies. It holds that nations cannot abdicate the responsibilities of their activities in space. Therefore nation states are always accountable for the actions involving any of their satellites (active payload or otherwise). Accountability is an essential element when establishing punitive reactions to breaches of the laws. How that accountability is assigned is addressed in further detail in the other treaties discussed later.

Given the provisions of the *UN Charter* mentioned above, Author John Rhinelandt concluded that, “The Outer Space Treaty does not prohibit activities that are in self-defense” (Rhinelandt 1990, 6). Upon their examination of the Outer Space Treaty, Authors Abram Chayes, Antonia Handler Chayes, and Eliot Spitzer agreed,

The Outer Space Treaty enunciates principles of international cooperation and the use of space for peaceful purposes. We have also seen that, from the beginning, this goal was broadly understood to accommodate passive military uses such as reconnaissance and communications. The positive rules of law laid down by the Outer Space Treaty, on the other hand, are much narrower in scope. One of them prohibits nuclear weapon in orbit. This, taken together with the ban in the Limited Nuclear Test Ban Treaty on nuclear explosions in outer space, has a decisive bearing on a narrow range of ABM and ASAT technology, specifically, the use of nuclear explosions in space as a power source for lasers. (Chayes 1986, 214)

Author Peter Jankowitsch also reviewed the Outer Space Treaty and after describing the various aspects of the treaty that specifically prohibits nuclear weapons and WMD, he offered several conclusions. The first is that the specific ban in the treaty of WMD is, “generally assumed to include chemical and biological weapons which cause severe and extensive damage, implies that conventional weapons and military support systems are not prohibited from Earth orbit” (1992, 147). Stojak elaborates: “Though the term ‘weapons of mass destruction’ is not defined, it is generally understood to include biological, radiological and chemical weapons, as well as any future weapons whose destructive potential would be catastrophic” (2002, 19). Stojak continues that, “The Outer Space Treaty therefore does not prohibit the development, testing, and deployment of ground-based or space-based non-nuclear ASAT systems. Fixed ground-based systems that can reach targets in space using conventional, nuclear, or directed-energy kill mechanisms are also permissible” (2002, 19).

Jankowitsch also argues that the restriction to not place the weapons in “orbit” about the Earth is “generally taken to apply only to objects which complete at least one full orbit of the Earth, thus not prohibiting ballistic missiles, which may reach an altitude well above that of many orbiting satellites but fall back to Earth before completing a full

circuit” (1992, 147). The implication, therefore, is that even WMDs may traverse “outer space” as long as the weapon never completes an orbit of the Earth.

Additionally, Jankowitsch explains that recent developments in weapons, not traditionally of concern in the space weaponization debate, such as a laser, “can raise new questions of the interpretation of the Treaty and the legal classification of the new systems” (1992, 147). He adds, “In some cases, whether or not a system is deemed to be a weapon prohibited by the Treaty will depend on the point of view of the state making the interpretation. Would any of the laser or directed-energy weapons, for instance, be considered as weapons of mass destruction?” (Jankowitsch 1992, 147). An additional problem concerns the wording of the restrictions, “In allowing the use of military personnel and implicitly the use of military support equipment, the Treaty raises but does not answer the question of precisely what sort of non-peaceful activities are prohibited” (Jankowitsch 1992, 148).

Jankowitsch concludes that the Outer Space treaty is a supremely important document in the realm of space law and answered several important dilemmas concerning space. He also explains that “there is a substantial range of military activities that are not covered by the Treaty, and some of its provisions need to be made more precise, either due to lack of clarity in the original wording or due to technological advances since the drafting of the Treaty” (1992, 148). Stojak concludes that the Outer Space Treaty:

Does not prohibit laser and other directed-energy weapons that are discriminate in character. Article IV also only prohibits the stationing of nuclear weapons in outer space. It does not cover development or ground-testing of weapons designed to be placed in space, nor the deployment on the ground of nuclear powered weapons, such as ‘pop-up weapons’ designed for use against space objects. It does not cover non-nuclear ASAT or BMD weapons.” (Stojak 2002, 19)

One area that could affect the deployment of an EM jamming system on orbit exists in Article IX of the Outer Space Treaty. Stojak explains:

Article IX requires States Parties to undertake international consultation before proceeding with any activity that would cause potentially “harmful interference” with the “peaceful exploration and use” of outer space by other States. Since the term “harmful interference” is not defined in the treaty, the question could be raised whether the words “harmful interference with activities in the peaceful exploration and use of outer space” also cover military activities in outer space. (Stojak 2002, 19)

The result is that the Outer Space Treaty does not represent a roadblock to the basing of an EM jamming system in space. In summary, the Outer Space Treaty does not restrict the basing of a conventional weapon system, much less an EM jamming system, in space as long as the placement of that system is not on the moon or other celestial body. The narrow interpretation of peaceful use or harmful interference could stand as the basis of a complaint against a nation that did orbit a weapon system about the Earth, but there are strong doubts that such a complaint would gain much support.

The Liability Convention of 1972

The Liability Convention of 1972 espouses the peaceful use of space in its preamble and has applicability to the weaponization of space in a parallel way. The Convention expands upon the principle of peaceful use in the preamble with the belief, “that the establishment of such rules and procedures will contribute to the strengthening of international cooperation in the field of the exploration of outer space for peaceful purposes” (United Nations 2002, 13).

The applicability of the Liability Convention requires a broad interpretation of the definition of “damage” that is included in the Convention. Within the treaty “damage” is defined as, “loss of life, personal injury, or other impairment of health; or loss of or

damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations” (United Nations 2002, 13). The possible effects from a weapon based in outer space could certainly be construed as damage under this definition. In the case that damage occurs on Earth from a space-based platform, there are liability reparations that come into force. Article II explains, “A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight” (United Nations 2002, 13). Article III adds a stipulation to damage occurring elsewhere by adding that, “In the event of damage being caused elsewhere than on the surface of the Earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the later shall be liable only if the damage is due to its fault or the fault of persons for whom it is responsible” (United Nations 2002, 14).

Article V addresses situations where two or more states jointly launch a satellite (to include conglomerations like the European Space Agency). “Whenever two or more States jointly launch a space object, they shall be jointly and severally liable for any damage caused” (United Nations 2002, 14). The implication is that if US were to launch an Indian EM jamming satellite and then India chooses to utilize that capability against Pakistan, the US would be jointly responsible for the damages inflicted. The problem occurs when trying to decide if the US is also responsible for an act of war as well. The concept that might apply is that the US would be an accessory to the conflict, but clearly not necessarily a direct participant. It is here that liability for support must be excluded from the aggressive acts of another nation.

Having an understanding of the conditions that would make a State liable for any damage caused by one of its space objects, there are certain exceptions, which when given a rather broad or narrow interpretation could either allow for or severely prohibit actions involving a deliberate use of a space-based weapon in warfare. The problematic statement that keeps this Convention from being more enforceable against the use of a space-based weapon exists in Article VI. “Exoneration from absolute liability shall be granted to the extent that a launching State establishes that the damage has resulted either wholly or partially from gross negligence or from an act or omission done with intent to cause damage on the part of the claimant State or of natural or juridical persons it represents” (United Nations 2002, 15). In this case, does a conflict or declaration of war qualify as intent to cause damage on the part of the claimant state? Is it assumed that valid military targets accept a reasonable risk of being destroyed, whether it be from space or otherwise?

The second part of the Convention adds a little more clarity. “No exoneration whatever shall be granted in cases where the damage has resulted from activities conducted by a launching State which are not in conformity with international law including, in particular, the Charter of the UN and the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies” (United Nations 2002, 15). This caveat suggests that as long as the weapons based in space are not WMD or produce the effect of WMDs, and the weapons are not used randomly but instead conform to the laws of armed conflict statutes legitimizing conflict in the other mediums on Earth, then there would be no liability from using space-based weapons. However, if those weapons are used improperly, there could

be a case made that the weapons are illegal and that use of them would make the launching state liable for any damage that the weapon inflicts.

The analysis of the Registration Convention is that there is no explicit restriction against the placement of an EM jamming system in orbit. This convention only provides a legal recourse against a state for compensation if damages are incurred from the space-based system. Thus, this convention does not prohibit weapons in space, but provides a mechanism to punish the improper use of that system.

Registration Convention of 1976

Much like its predecessor, the Registration Convention espouses the peaceful use of outer space in its preamble. The majority of the articles in the Convention relate to the cataloging and registration of objects launched into space. Nominally, the register was set up to ease the process of investigating and determining liability in accordance with the Liability Convention and for establishing a mechanism for tracking what objects occupy the geostationary belt about the equator. There is a provision in Article IV that has limited, almost tangential, application to the space weaponization debate. The Article states that certain data must be provided to the UN register as soon as practicable. The data requirement includes the initial orbital parameters of the space object and most specifically the “general function of the space object” (United Nations 2002, 24). This requirement seems to infer that there should be no way to secretly place a weapon in space. The general function of the satellite would theoretically have to be declared. Obviously, military satellites true functions are rarely reported in a specific sense to the UN by any space-faring nation.

An Article VI caveat makes hiding the nature of a space-based weapon even more difficult.

Where the application of the provisions of this convention has not enabled a State Party to identify a space object which has caused damage to it or to any of its natural or juridical persons, or which may be of hazardous or deleterious nature, other States Parties, including in particular States possessing space monitoring and tracking facilities, shall respond to the greatest extent feasible to a request by that State Party, or transmitted through the Secretary-General on its behalf, for assistance under equitable and reasonable conditions in the identification of the object. (United Nations 2002, 24)

The analysis concludes that there is no provision that explicitly prohibits the placement of an EM jamming system in orbit. The implicit restriction only lies in the peaceful use declarations that weave throughout all of the space treaties which have been discussed earlier in this chapter. The real effect of this convention is simply to ensure that punitive actions can be taken against a state if damage occurs from a space object. This is generic to all Earth orbiting objects and has no restrictive bearing on the placement of an EM jamming system in space.

International Customary Law Analysis

Between 1957 with the launch of Sputnik and 1967 with the ratification of the Outer Space Treaty, no formal law existed that addressed the area of space law. It was the actions of the two space-faring nations combined, with the reactions of the international community that established the largest body of customary law regarding space activities. Stojak explains, “Since the inception of space activities, States have acted as if [the use of outer space for peaceful purposes with no restrictions to any State] were part of international law and no action is known to have formally questioned their authority. For this reason, there is a widespread agreement that the principles of freedom of exploration

and non-appropriation are part of customary international law” (2002, 18). In contrast, Jankowitsch illustrates how integral the military has been in influencing customary space law. He remarks that when the first nuclear weapon was tested in space in 1962, “Suddenly, the extension of the arms race into outer space posed a real and present threat to international peace and security, and the question of the prevention of the militarization of outer space gained importance” (1992, 143).

In contrast to the strict interpretation of formal international law, customary law is reliant upon the spirit of the law interpretation. This is due to the absence of any ratified language. Bruce DeBlois explains this concept. “There is the softer interpretation of intent and/or precedent; that is in this case, several decades of de facto policies that should not be lightly overturned” (2003, 48). Therefore, for the purposes of this analysis, the spirit or intent (whether narrowly or broadly interpreted) is used when describing the concepts embodied by customary law.

Between the years of 1955 and 1967, a series of UN declarations gained the force of customary law. Although several of these declarations were later codified in the series of five major treaties, thus becoming formal law, there are some underlying precepts and tenets included that did not make it to the formal treaty texts. Nevertheless, the US, as a member of the UN General Council, effectively signed on to these ideals in small measure when they were released in the late 1950s and early 1960s. The COPOUS documents and the Moon Treaty, which the US did not ratify with signature, and the ABM Treaty, which the US abrogated, serve as applicable examples of international customary law that the US would be measured against.

Resolution 1348 (XIII)

Resolution 1348 (XIII), which established COPOUS as an ad hoc organization, recognizes, “the common interest of mankind in outer space and . . . that it is the common aim that outer space should be used for peaceful purposes only” (United Nations 1958, 1). Three other declarations within the resolution also extol the virtues that space should be used for peaceful purposes. The General Assembly tasked COPOUS to report on, “The activities and resources of the UN, of its specialized agencies and of international bodies relating to the peaceful uses of outer space,” and “the area of international co-operation and programmes in the peaceful uses of outer space which could be appropriately be undertaken under UN auspices to the benefit of States irrespective of the state of their economic or scientific development,” and, finally, “the nature of legal problems which may arise in the carrying out of programmes to explore outer space” (United Nations 1958, 2).

Resolution 1472 (XIV)

Resolution 1472 (XIV), which permanently established COPOUS, recognized, “the common interest of mankind as a whole in furthering the peaceful use of outer space,” and established the “great importance of international cooperation in the exploration and exploitation of outer space for peaceful purposes” (United Nations 1959, 1). This second declaration implies that any exploitation of space for military use, such as reconnaissance satellites of today, should at least be second fiddle to peaceful purposes but at best should be abandoned. That strict interpretation is clearly problematic when one considers the dual use capability of imagery satellites in particular. Imagery satellites have been used to coordinate and aid disaster relief efforts at various times. The difficulty

comes when trying to designate a space platform for strictly military or peaceful application. Clearly, the strict non-military use of space viewpoint never really took root in later application.

Resolution 1721 (XVI)

Resolution 1721 (XVI) identifies the applicability of international law to outer space activities. It first recognizes, “the common interest of mankind in furthering the peaceful uses of outer space and the urgent need to strengthen international co-operation in this important field” (United Nations 1961, 1). It then declares that, “International law, including the Charter of the UN, applies to outer space and celestial bodies” (United Nations 1961, 1).

Resolution 1802 (XVII)

Resolution 1802 (XVII) creates a UN sounding rocket program and further refines the interactions with the World Meteorological Organization and International Telecommunications Union. It also solidifies the application of international law to space activities. It begins with the belief that, “the activities of States in the exploration and use of outer space should be carried out in conformity with international law including the Charter of the UN, in the interest of friendly relations among nations” (United Nations 1962, 1). It stressed the “necessity of the progressive development of international law pertaining to the further elaboration of basic legal principles governing the activities of States in the exploration and use of outer space and to liability for space vehicle accidents and . . . to other legal problems” (United Nations 1962, 1).

Resolution 1884 (XVIII)

Resolution 1884 (XVIII) specifies the determination to “take steps to prevent the spread of the [nuclear] arms race to outer space” (United Nations 1963a, 1). It thanks the US and Union of Soviet Socialist Republics for “their intention not to station in outer space any objects carrying nuclear weapons or other kinds of weapons of mass destruction” (United Nations 1963a, 1).

Resolution 1962 (XVIII)

Resolution 1962(XVIII) formally established some legal principles that COPOUS had decided upon and forwarded to the General Assembly for approval. The Resolution begins with several principles which include recognizing, “the common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes,” and desire to, “contribute to broad international cooperation in the scientific as well as in the legal aspects of exploration and use of outer space for peaceful purposes” (United Nations 1963b, 1). The Resolution then delineates nine legal principles that apply to the use of outer space. Four of the principles apply to the space weaponization debate. One of the articles establishes the applicability of international law and the UN charter to space activities. “The activities of States in the exploration and use of outer space shall be carried on in accordance with international law, including the Charter of the UN, in the interest of maintaining international peace and security and promoting international cooperation and understanding” (United Nations 1963b, 2). The next article declares states liable for their actions in outer space. “States bear international responsibility for national activities in outer space, whether carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried on in

conformity with the principles set forth in the present Declaration” (United Nations 1963b, 2). Another article requires non-interference between peaceful space activities planned by nations.

If a State has reason to believe that an outer space activity or experiment planned by it or its nationals would cause potentially harmful interference with activities of other States in the peaceful exploration and use of outer space, it shall undertake appropriate international consultations before proceeding with any such space activity or experiment. A State which has reason to believe that an outer space activity or experiment planned by another State would cause potentially harmful interference with activities in the peaceful exploration and use of outer space may request consultation concerning the activity or experiment. (United Nations 1963b, 2)

The last applicable article establishes the expectation that nations are responsible for the items they launch into space and that they must be held liable for any damage caused by their space objects. “Each State which launches or procures the launching of an object into outer space, and each State from whose territory or facility an object is launched, is internationally liable for damage to a foreign State or to its natural or juridical persons by such object or its component parts on the earth, in air space, or in outer space” (United Nations 1963b, 3).

Resolution 1963 (XVIII)

Resolution 1963 (XVIII) recommended the need to formalize the legal principles and ideals forwarded in the previous declarations mentioned above. This is the task that caused the drafters to prepare the Outer Space Treaty, which was ratified four years later.

Ultimately none of these provisions directly or explicitly prohibit weapons in space. The concept of peaceful use is clearly intertwined with all of the declarations, but, as discussed above in this chapter, there is no clear provision that prohibits weapons in space, much less an EM jamming system.

Moon Treaty

While acknowledging that the US never formally ratified Treaty was, it was unanimously forwarded by the UN General Assembly. The Moon Treaty provides clarity to some of the ambiguous provisions of the Outer Space Treaty. It specifically addresses the prohibition of military use of the Moon. It also extends those prohibitions to lunar and other celestial body orbits and the trajectories necessary to achieve those orbits.

Jankowitsch concluded, “Thus, all of outer space beyond Earth orbit is to be used for exclusively peaceful purposes” (1992, 149).

The Moon Treaty, as Jankowitsch explained, still contains several points of contention similar to the arguments generated by the Outer Space Treaty. “The term ‘peaceful purposes,’ however, remains subject to different interpretations” (1992, 149).

Jankowitsch explains the two opposing views of the former superpowers concerning this debate:

According to legal scholars from the former Soviet Union and some other countries, and in the tradition of socialist jurisprudence, the provision for exclusively peaceful purposes implies a prohibition of all military activities except those specifically permitted by the Treaty. Scholars from the United States and some other Western countries, on the other hand, interpret ‘peaceful’ to exclude only aggressive or offensive activities, allowing defensive military activities. It has been argued, for example, that the verification function of military reconnaissance satellites facilitates agreement on arms control measures and should therefore be considered a peaceful space activity. (Jankowitsch 1992, 149)

Jankowitsch laments the fact that the Moon Treaty did not further explain a more precise version of what “peaceful purposes” connotes.

If anything, the author argues, the Moon Treaty actually adds more confusion with the inclusion of an additional stipulation concerning militarization of space. The controversy surrounds the article that “prohibits, among other things, any threat or use of

force or any other hostile act on the Moon or the use of the Moon to commit any such act” (Jankowitsch 1992, 149). “It does not,” Jankowitsch noted, “define the prohibited acts any more precisely, leaving a good deal of room for interpretation. The question has arisen, for example, as to whether non-aggressive military action could or should be perceived as a threat of force” (1992, 149). While this sort of ambiguity, as argued above, often was suited to appease the super powers and to provide them greater latitude in the utilization of space, it is ironic that the US did not end up ratifying this particular Treaty. Jankowitsch’s final observation concerning the Moon Treaty is telling of the frustration involved with most space treaties addressing the militarization of space:

As has often been pointed out, however, the activities that have been prohibited, such as installing nuclear weapons on the Moon, are of little practical interest. The important practical military uses, including military support functions and non-nuclear anti-satellite weapons, are left open by international space law. In the case of military support systems, there is a widespread, though hardly unanimous, view that these command, control, and intelligence-gathering functions contribute to global stability and should not be limited. In the case of weapons systems, there is a much broader feeling that they are destabilizing and should be banned. While this issue has been raised many times in UN bodies, there has been no significant movement toward an agreement to limit them. (Jankowitsch 1992, 150)

Tim Sands agrees and elaborates, “some wars will be fought to obtain peace and will be sanctioned by the UN. A military Electronic Warfare Officer could legally ride aboard the Space Shuttle to operate radar-jamming equipment during sanctioned conflict. This would not be prohibited by the Outer Space Treaty and is also consistent with the details of the Moon Treaty details” (Sands 2001, 12).

Ultimately there is no provision or concept that would prohibit the placing of an EM jamming system on orbit, as long as it was not placed on the moon or other celestial body. Implicitly this treaty is the most restrictive when considering the militarization and therefore the weaponization of space. With regards to the US, as a source of customary

law, this treaty is the most limiting, which partially accounts for the reason the US has not signed it. Given the narrowest interpretations, there could be a basis of complaint, however as mentioned above, that would most likely reap little benefit due to a lack of majority international support.

Anti-Ballistic Missile Treaty

Peter Jankowitsch explained that in 1983, “deep dismay was expressed in various bodies of the UN by delegations who felt that the major powers were extending their arms race into the outer space environment, making ‘space law’ no longer a figment of science fiction but a growing component of their global military strategies” (1992, 143). Jankowitsch notes that, “The only agreements that have been reached relating to conventional military activities in Earth orbit have been bilateral agreements” (1992, 150). He illuminates the discussions that lead to several bilateral treaties between the US and the Soviet Union. These treaties are relevant for a couple reasons. One: “Decisions on the development and deployment of space-based weapons or ground-based weapons for use in space were being taken in Washington and Moscow, with no opportunity for other countries to influence the outcome” (Jankowitsch 1992, 150). Two and possibly more importantly, these bilateral treaties resulted from, “discussions focused on ballistic missiles, which are not regarded as coming within the scope of space law, they had some provisions relating to military space activities in the accepted sense” (Jankowitsch 1992, 150).

Of these treaties, Jankowitsch focuses exclusively upon the ABM Treaty. Because the US recently abrogated the ABM Treaty, the provisions are no longer binding on the US. It may be fair to say that the US still plans to abide by many of the original principles

of the ABM Treaty, choosing which sections to disregard and which sections to abide by. Without a clear indication of which articles those would be, a detailed analysis of the ABM Treaty as a whole becomes meaningless. Many of the tenets of the agreement will probably serve as a source of customary law.

As expected, based upon historic precedent, there is nothing in the body of international customary law that specifically prohibits conventional weapons in orbit. This is clearly a reflection of the influence of the two cold war superpowers reserving a defensive, if not offensive, capability for later exploitation. The current trend of the US, as will be discussed below, is to continue to reserve the right to place conventional weapons in space. There is nothing presently that would legally stand in the way.

Domestic Law Analysis

Any program to place American weapons in space would necessarily be subject to domestic policy restrictions. Author R. Cargill Hall explains the pillars of domestic space policy:

National space policy derives from four principal sources. First, and least known, are the classified presidential directives issued through the National Security Council, such as NSC 5520 in May 1955 that surreptitiously sought international acceptance of overhead reconnaissance via the principle of “freedom of space.” Second are Public Laws, for example, Eisenhower’s National Aeronautics and Space Act of 1958. The third consists of presidential policy declarations--such as President Kennedy’s call for a manned landing on the moon before 1970, a declaration that congress embraced. Fourth, international conventions such as the 1967 Outer Space Treaty and the 1972 Interim SALT I and ABM treaties, which on ratification become public law too, also are crucial elements of national space policy. (Hall 2006, 20)

American space policy has remained remarkably consistent since the first attempts to explore the vast oceans of space. Six underlying currents remain relatively unchanged since the first declaration of space policy in 1955. These include:

-Freedom of space, that is, free access to and unimpeded passage through space for the satellites of any nation.

- Explore and use outer space for “peaceful” purposes for the benefit of all mankind. (Peaceful purposes in the 1950s was [and remains today] interpreted as allowing defense support and intelligence-related space activities in pursuit of national security.)

- Reject any claims to sovereignty over outer space or over celestial bodies, and to any limits on the fundamental right to acquire data from space.

- Pursue three separate albeit interrelated government space programs: civil, military, and intelligence.

- Respect the space systems of any nation as national property with the right of passage through and operations in space without interference. Purposeful interference with operational space systems is viewed as infringement on sovereign rights.

- Conduct if necessary activities in outer space in support of its right to self-defense (Hall 2006, 20).

These themes are threaded throughout domestic space policy and can be found, in varying degrees, in the current administration’s stance regarding space. Because of their consistency over the past four decades, there is established precedent, and thereby customary law concerning these themes. An administration wishing to establish space policy contrary to these ideals would have to drum up strong support within all the branches of government and the voting public.

Nothing in domestic customary law explicitly prohibits the placement of a conventional weapon in space, much less an EM jamming capability. In fact one space policy tenet consistently reserves the right to defend US interests, even if that should require basing weapons in space. It is a step that would not be taken lightly. The benefits of weaponizing space would have to clearly outweigh the likelihood of adversaries like China or Russia gaining a like capability. During the cold war it was prevention of Soviet

militarization and eventual weaponization of space that the US feared, and it was that sanctuary that the US sought to preserve in order to maintain relative parity on the land, sea and in the air.

National Aeronautics and Space Administration Act of 1958

The NASA Act serves as a focus of formal domestic space law. Although it primarily focuses upon a civil organization, as opposed to the DoD military organization, it has applicability to the weaponization debate. Former USAF officer and history professor David Spires explains the impact that the NASA Act had upon the division of civil and military space. He explains that the NASA Act, “formally established a dual space program comprising separate civilian scientific and military applications. However, despite the apparent logic in assuming that NASA would be responsible for civilian space activities and DOD would handle military interests, the demarcation line between civilian and military space concerns often proved artificial and unattainable” (1995, 38). The NASA Act reflects the US efforts to balance the peaceful use and militarization of space.

The NASA Act affirms and espouses the concept of the peaceful use of space. “Sec. 102. (a) The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind. (b) The Congress declares that the general welfare and security of the United States require that adequate provision be made for aeronautical and space activities” (NASA Act 1958, 2).

Notice that while section (a) promotes peaceful use, section (b) explains that the security of the US may require actions in space. This duality is not new for Americans. It began with the fear of waking up under a communist moon manifested after the launch of

Sputnik. It continues today with the tenuous security of the space assets used by the military. This reservation is important because it is the continued caveat allowing the militarization and potential weaponization of space.

Looking at the creation of NASA, the duties of civil space were separated from military space, even though they were necessarily intertwined because of capabilities each brought to the table. NASA focused upon the scientific aspects of space, including landing on the moon while the military focused on national defense through ICBMs and reconnaissance satellites. It was the sharing of technological innovations that kept the two agencies inseparable.

As mentioned above when analyzing international law, there is no domestic definition of peaceful use. This is not surprising since the US was influential in the UN efforts to establish formal international space law. As mentioned earlier, it was not necessarily within the interests of the US to fully define that term as it could serve to limit the capability to defend itself during the cold war nuclear standoff with the Soviet Union. There is no domestic restriction that prohibits the placement of weapons in space. In fact, it is probable that the US sought specifically to place conventional weapons in space provided it could gain a definite advantage over the Soviets without resulting in an escalation of the arms race or risk the outbreak of nuclear war.

2006 National Space Policy

The tone of the most recent National Space Policy (NSP) belies the nature of the current American view regarding the use of space. The NSP effectively equates to the current usage of open waters in the maritime environment. In addition to the American interpretation of peaceful use described above, three other concepts delineated in the

policy have direct relevance to the weaponization of space debate. One of the principles states that, “The United States will seek to cooperate with other nations in the peaceful use of outer space to extend the benefits of space, enhance space exploration, and to protect and promote freedom around the world” (NSPD 48 2006, 1). This illustrates US intent to remain committed to the spirit of open access and espouses the rhetoric of sharing space peacefully, if possible, with all other nations.

A more aggressive policy view of space, when compared to the ideals espoused by the COPOUS, emerges in another principle,

The United States considers space capabilities—including the ground and space segments and supporting links—vital to its national interests. Consistent with this policy, the United States will: preserve its rights, capabilities, and freedom of action in space; dissuade or deter others from either impeding those rights or developing capabilities intended to do so; take those actions necessary to protect its space capabilities; respond to interference; and deny, if necessary, adversaries the use of space capabilities hostile to U.S. national interests. (NSPD 48 2006 1-2)

While this does not imply that the US intends to deploy space-based weapons any time soon, it does allow for that possibility.

One of the more controversial declarations is in the penultimate principle in the NSP. It is this principle that many critics see as a recent shift in American policy to move war into outer space.

The United States will oppose the development of new legal regimes or other restrictions that seek to prohibit or limit U.S. access to or use of space. Proposed arms control agreements or restrictions must not impair the rights of the United States to conduct research, development, testing, and operations or other activities in space for U.S. national interests. (NSPD 48 2006, 2)

This stance, although not all that revolutionary or inflammatory, has drawn a great deal of attention and sparked much debate.

What emerges is a clear understanding that there is no domestic policy prohibition against the placement of weapons in outer space. If anything, as some argue, this most recent space policy actually forecasts the weaponization of space. This is not surprising when one looks at a couple key events leading to the publishing of the *2006 NSP*.

The biggest influence would be the terrorist attacks of 11 September. It is impossible to remove that event from the psyche of the Bush administration. It clearly changed the character and tone of security strategy, and the realm of space was certainly not immune.

Almost a full year before that event, in 2000, the congressionally mandated CAUSNSSMO recommended that the US should “develop and deploy the means to deter and defend against hostile acts directed at U.S. space assets and against the uses of space hostile to U.S. interests” (Commission to Assess 2001, xv). Latter recommendations go even further, “Unlike weapons from aircraft, land forces or ships, space missions initiated from earth or space could be carried out with little transit, information or weather delay. Having this capability would give the U.S. a much stronger deterrent and, in a conflict, an extraordinary military advantage” (Commission to Assess 2001, 33). CAUSNSSMO goes even further to recognize that space is so integral to US security and interests that other nation-states continue to try to limit even today’s militarization of space through diplomatic measures. The commission explained:

To counter U.S. advantages in space, other states and international organizations have sought agreements that would restrict the use of space. For example, nearly every year, the U.N. General Assembly passes a resolution calling for prevention of “an arms race in outer space” by prohibiting all space weapons. Russia and China have proposed to prohibit the use of space for national missile defense. The U.S. should seek to preserve the space weapons regime established by the Outer Space Treaty, particularly the traditional interpretation of

the Treaty's "peaceful purposes" language to mean that both self-defense and non-aggressive military use of space are allowed. (Commission to Assess 2001, 37)

Obviously, having been appointed Secretary of Defense in the Bush administration, Donald Rumsfeld, the Chairperson for CAUSNSSMO, influenced the crafting of the National Space Policy published five years later.

Legality Analysis

In the final analysis, domestic law, customary law, or formal law does not prohibit the weaponization of space, much less the placing of a non-weapon, such as an EM jamming platform in space. There is no evidence that a legal prohibition exists that would prohibit the placing of an EM jamming system into space. This conclusion allowed for the analysis to move on to the final tier of Political Prohibitions. While there is nothing in the legal arena that would prevent the US from placing an EM jamming platform in space, the political considerations are not so accommodating.

Is There a Political Prohibition?

Unfortunately, because of the divisive nature of the debate surrounding the weaponization of space, there is little discussion of the political implications of placing a non-weapon into space. If a platform is not a weapon, then it may more likely be accepted as just another facet of space militarization. Even some of the most argumentative groups against militarization of space recognize some need of military capability. Bruce Gagnon, head of the Global Network Against Weapons and Nuclear Power in Space explains:

Weaponization I think is clear. Our position is no weapons in space, at any level, period. Militarization is more complicated. . . .While we accept some

aspects of the militarization of space for treaty verification, confidence building measures, etc., we are firmly against military space technologies that are used for conventional war fighting. . . . Satellite systems that identify and direct war on Earth, which essentially allow for “full spectrum dominance” are not acceptable in our view. We want a de-escalation of all military systems for fighting war on Earth or in space. We’d like to see the stabilizing, treaty verifying satellite technologies commonly shared globally. (David 2002, 5)

The complication is that EM jamming is not a weapon. Almost every policy debate revolves around either zero tolerance for military use of space or suggests a ban against conventional weapons. Therefore, is there political sentiment that might prohibit fielding an EM jamming system?

The issue would revolve around the perception of EM jamming and the relative insecurity that it would produce upon America’s adversaries. Domestically the debate revolves around destruction, as noted by a congressional staffer. “‘The Democrats don’t have a monopoly on wisdom,’ the Democratic aide said, but they are uncomfortable with being the ‘first nation to put a destructive weapon in orbit’” (Ratnam 2006, 1-48). This statement implies that there would be no objection to EM jamming from space.

It is safe to say that an adversary nation would rather label space-based EM jamming as a weapon system, especially if there is a chance of steering international sentiment against the US in order to mitigate the inherent advantage. Several analysts echo that view in their arguments against weaponizing space. “The current U.N. (draft) treaty to prohibit the weaponization of space was introduced by China and Russia--the two nations most active in space today. Only the naïve would argue that Beijing and Moscow wouldn’t deploy space weapons today if they could. The treaty is merely their diplomatic gambit to buy time to develop their own programs” (Brookes 2006, 1-52). Deblois elaborates, “Any unilateral decision to weaponize space might have negative

consequences for diplomatic relationships worldwide. The European Union has been a consistent and vocal critic and, as validated by multiple resolutions in the UN regarding the prevention of an arms race in outer space (PAROS), reflects the opinions of the larger international community” (2003, 43).

However, the political calculus has to take into account the US influence in steering space law and the need to address national security when measuring the effect of international cries of protest. The CAUSNSSMO recommended:

As interest in and use of space increases, both within the United States and around the world, the U.S. must participate actively in shaping the space legal and regulatory environment. Because of its investment in space and its increasing dependence on space-based capabilities, the U.S. has a large stake in how this environment evolves. To protect the country’s interests, the U.S. must promote the peaceful use of space, monitor activities of regulatory bodies, and protect the rights of nations to defend their interests in and from space.” (Committee to Assess 2001, 36)

This course of action is not without risk. A huge concern for the US is the analysis that, “Many models for political interaction would predict that a nation with so much power would prompt other nations to form alliances against it. The fact that this has not happened is arguably a result of past U.S. restraint in exercising power” (Spacy 1998, 91). There is a real possibility that by being the first and only nation with orbital weapons, the trust built with allied nations may erode and neutral or enemy nations would band against the US in retaliation.

Several analysts, like Gopal Ratnam at Defense News, suggest that the US cannot afford to wait long. “Everett Dolman, a professor at the School of Advanced Air and Space Studies, Maxwell Air Force Base, Alabama, believes that developing orbital weapons is necessary to prevent other nations, such as India and China, from doing so first. . . . Dolman said the key question is ‘not whether the United States should be the

first to weaponize space, or whether space weaponization is inevitable, but rather can the United States be the second state to weaponize space?” (Ratnam 2006, 1-48). Deblois continues, “Voluntarily limiting defensive options by excluding space-based weapons jeopardizes the superiority of military information resources. Weapons must be allowed to migrate to space for these defensive purposes, else the epitaph of the next war might be: ‘we could see, hear and talk all through the first few hours of the war. After that, they decided that we should not’” (2003, 38). A dire prediction, if it should come true. But, with that sort of rationale and given US influence in international politics, it seems that the need for defending US interests would outweigh the international backlash.

The largest hurdle for the US seems to be domestic support for the action of inching toward weaponization of space. Spacy argues, “As the first openly proposed plan for putting weapons in space, the Strategic Defense Initiative generated more controversy than any previous space weapons system” (1998, 93). The criticism of the SDI ranged from excessive cost to technological infeasibility to political destabilization to even nuclear holocaust (1998, 92-93). Spacy then brings the analysis to more recent proposals by noting that, “If the controversy surrounding a recent U.S. test-firing of a ground-based laser at a satellite is any indication, opposition to using weapons in space remains strong today. This opposition continues to be directed against all weapons intended to engage targets in space, regardless of where they are based” (1998, 93). Spacy then points to newspaper articles denouncing the test firing of the MIRACL laser in 1997. “The fact remains,” Spacy concluded, “that using weapons in space is still extremely controversial, and actually placing a weapon in space is certain to be more so” (1998, 94). He adds that,

“Given the limited advantages offered by space-based weapons, adverse political implications make developing them truly questionable” (1998, 96).

Given that domestic support of clearly recognizable weapons is doubtful, the argument for a gradual approach nearly justifies a non-weapon system like space-based EM jamming. It fits into recent measures to limit damage on the battlefield and endeavors to exploit nonlethal technologies in warfare. These tenets make space-based EM jamming more palatable when compared to traditional destructive weapons. If the security need is identified and must be addressed, space-based EM jamming is a logical first step.

Conclusion

By utilizing the analysis framework presented in chapter 3, the researcher was able to apply the four tiered approach to help answer the primary question: Given that space-based EM jamming is technically feasible, do the current bodies of laws, treaties and policies applicable to the US prohibit fielding a space-based disruptive EM jamming system? Once determined that the EM jamming was space-based, it was determined that it did not meet the criteria for being classified as a weapon. That moved the analysis to explore any legal constraints. Finding none, the final hurdle was looking for any political constraints. The research did not find compelling political prohibition. The answer to the primary question, therefore, is no. Given that space-based EM jamming is technically feasible, the current bodies of laws, treaties, and policies applicable to the US do not prohibit fielding a space-based EM jamming system.

Chapter 1 of this thesis introduced the fundamental concerns in the debate about weaponization of space and inquires about the problematic introduction of space-based EM jamming. Chapter 2 provided a review of the current literature concerning this topic.

Chapter 3 explained the methodology used to explore the research question. Chapter 5 will apply the results of the analysis to develop further recommendations for study and examination.

CHAPTER 5

RECOMMENDATIONS

There are many detailed questions and foreseeable problems that remain unresolved, and new developments in space technology and application are continually generating new questions and problems that need to be resolved in the future. (1992, XVIII)

Nandasiri Jasentuliyana, "Introduction,"
Space Law-Development and Scope.

Summary

The purpose of this thesis was to answer the primary question: Given that space-based EM jamming is technically feasible, do the current bodies of laws, treaties and policies applicable to the United States prohibit fielding a space-based disruptive EM jamming system? The topic was broken down into a series of questions that framed the order of research: (1) What are the current international space treaties and laws and what are the applicable domestic space laws and policies? (2) What is EM jamming? (3) What are the applicable legal definitions of weapon and peaceful use? and (4) What is the demarcation of where airspace ends and outer space begins?

Analysis revealed there are no current explicit prohibitions preventing the US from fielding a disruptive EM jamming system. EM jamming did not cross the threshold of classic definitions used to describe weapons and weapon systems; therefore, the debate over weaponization of space is moot. Neither current international space treaties and agreements nor domestic laws and policies, whether formal or customary, explicitly prohibit the fielding of an EM jamming system in space. Finally, given the distinction between EM jamming and space weapons, fielding a space-based EM jamming system will be politically acceptable.

Recommendations

The United States should develop and field a space-based EM jamming system. This system would augment the military's eroding EM jamming capability and benefit from the unfettered access to hostile territory. It is in the interest of the US to continue to explore technologies that would help protect its forces as it forges ahead with transformation into a global expeditionary force. Space-based EM jamming provides worldwide access, relatively immediate responsiveness, survivability, and potentially persistent presence. Deliberate steps must be taken concurrently to prevent precipitating a space arms race.

The Outer Space Treaty should be amended or a new space treaty created that differentiates and defines the boundaries of air space from outer space. This definition should be based upon functional method as explained in chapter 4. Such a definition is needed in order to prevent further confusion and frame the space weaponization debate by defining the boundaries of what is and is not acceptable for the application of air and space law.

Diplomatic and political efforts should prevent new legislation that could hinder placing an EM jamming capability in space. Further treaties should attempt to limit anti-satellite (ASAT) development and proliferation and create a legal sanctuary for defensive measures. This effort would be aimed at derailing any possible escalation to the space arms race, which is clearly the desire of the UN and well within the interest of all space-faring nations. This strategy acknowledges that warfare continues to migrate into the space arena, but could help retard the rate at which weaponization progresses while retaining the capability to exploit space for both civilian and military use. Limiting ASAT

development would also have the added benefit of freeing up funding for space defensive measures research, further entrenching the futility of fielding offensive counter-space technologies.

A strategic communications campaign should be started to educate and influence public opinion concerning a space-based EM jamming capability. This information operation should explain the defensive nature of EM jamming and should focus upon the advantages of such a system. It should educate the general populace upon the issues surrounding the space militarization and weaponization debate. In concert with the diplomatic efforts mentioned above, this tactic would prepare the international community for the political and legal legitimacy of placing an EM jamming capability into space prior to actual fielding. At worst, the campaign would serve as a canary in the mine gauging international acceptance prior to full development and fielding of a space-based EM jamming system.

Further Research

The area of space law surrounding weaponization of space is, at best, vague. Jasentuliaya explains that there exists “a need for a generally accepted international political, legal, and regulatory framework to enable countries to use space without conflict, or at least with a minimum of conflict” (1992, XVII). Jankowitsch cites that the members of the UN Conference on Disarmament, “have stated repeatedly that the present legal regime governing military activities in outer space is no longer adequate” (1992, 153). The Conference has many items on its agenda that will either add greater clarity to the current treaties by providing definitions of several of the key controversial terms or by proposing new treaties in order to formalize and codify additional guidelines and

limitations upon space militarization. “Most of the recent proposals continue to run into the now familiar objections that they are either too limited or too broad in their scope” Jankowitsch remarked, “and that they do not provide for effective measures to ensure compliance” (1992, 154).

Jankowitsch agreed that there is no definitive answer that addresses most of the ambiguous sections of the current space treaties. He argues that in order for a treaty to be ratified, it often must be watered down so as not to overly restrict the actions of the major nations who must serve as signatories. If the major space-faring nations are not willing to ratify a given treaty, then the treaty is virtually meaningless. Therefore, until the major space powers (for example, the US, Russia, China, India, and the European Union) reach a majority (or better yet unanimous) agreement upon these controversies, they will continue to fester until a significant event forces the issue and breaks the stalemate.

It is likely that the ambiguous sections of the space treaties will not significantly change any time soon; there are some issues that require further research:

1. Could EM jamming systems be effectively used in a self-defense role for satellites? The Chinese recently demonstrated an ASAT capability by destroying one of their orbiting spacecraft using a projectile launched from the Earth’s surface. The Former Soviet Union and US have previously demonstrated equivalent capabilities, and the US continues to explore the capability to destroy ICBMs early in flight as a part of the National Missile Defense architecture. It is possible (and perhaps even more probable) to place a low-power self-protection EM jammer on key orbiting payloads to jam the seeker of a projectile, spoof the fuze of a warhead or to deny intercept information to the controlling ground station. An area of study should focus upon the need, capability,

feasibility, utility, and desire to provide an EM jamming self-protect system upon space platforms.

2. What additional countermeasure technologies could be used to support self-defense of satellite platforms? Reliance upon space capabilities continues to grow and with the proliferation of ASAT technologies, it is logical to examine the capabilities to protect vital payloads from service denial to outright destruction. Additional research should examine the feasibility and utility of self-protect measures that are already employed by aircraft or that should be developed based upon current and future threats. Is it worthwhile to build a low-observable payload? Could satellites safely employ some sort of non-persistent chaff as a self-defense measure against ASATs? Should payloads, especially low Earth orbiting payloads, be provided a significant thruster fuel reserve to maneuver in response to an ASAT threat? Should armor shielding be explored to protect against directed kinetic attacks? Is it possible to provide an albedo coating that would protect against laser threats to the payload? Not only should the feasibility and utility of such measures be examined, but the political consequences of such actions should also be studied. It is likely that the move to protect payloads from damage could escalate the much feared space arms race as efforts are made to overcome the defenses. It is also possible that the defenses could be less costly and much more effective than offensive technologies, which may cause an abandonment of ASAT development for the foreseeable future. Arguably, if space defensive measures were able to outpace offensive development then it could create a stabilizing influence upon international conflict in the space arena. Either way, this is an area of study that should not be ignored.

3. What is the cost benefit analysis of fielding space-based EM jamming as opposed to the current air and ground-based family of systems? While space-based EM jamming has been shown to be technically feasible and legally acceptable, is it worth the cost militarily or economically? What unique tactical advantages can space-based EM jamming provide?

4. What is the potential of the military industrial complex to develop and field a space-based EM jamming capability in a timely manner? Is satellite manufacturing capable to absorb the addition of another satellite or family of satellites in an efficient manner? Not only should satellite and booster manufacturing be examined, but launching capacity and command and control capacity should also be assessed. What would be required in order to increase these capacities and is that cost worth the reward? In and of itself, there may be a need to increase manufacturing capacity regardless of the cost due to the threat to US space-based assets. It would be useful to examine these issues early and be prepared to answer such questions if ASAT technologies continue to proliferate.

Chapter Summary and Conclusion

Space-based EM jamming is a relatively new concept only recently demonstrated as technically feasible. Within the current international and domestic climate, there is no treaty, law, or policy that would prevent the fielding of such a system and the US would clearly benefit strategically from such a capability. Therefore, additional thought and analysis should be devoted to exploring and refining the issues surrounding space-based EA. Such discussions would help resolve the current ambiguity of international space law and define what is and is not acceptable concerning the weaponization of space.

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