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SHAPING THE SPACE MEDIUM:
DOES THE GEOGRAPHIC CINC MODEL APPLY?

BY

DR. BRIAN K. ANDERSON, MAJOR, USAF

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APPROVAL

The undersigned certify that this thesis meets masters-level standards of research, argumentation, and expression.

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Disclaimer

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, or Air University.

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Abstract

In 1999, USCINCSpace/J5 commissioned a study through the Institute for National Security Studies asking the question, "How should the USCINCSpace go about shaping the region of space in accordance with the National Military Strategy?" The research question went on to ask if there are any systematic approaches used by other CINCs to shape their AOR that can be used by USCINCSpace to shape the region of space. This study analyzes one way in which the USCINSSpace might best shape the medium of space. The 1997 National Military Strategy builds on the premise that the United States will remain globally engaged to shape the international environment and create conditions favorable to US interests and global security. Does this include shaping the region of space? Terms like shaping, region, AOR, and aerospace have different contextual meanings and often raise emotional responses. This paper places those terms in their proper context. Finally, this paper directly applies the geographic CINC model for shaping as it is described in the US National Military Strategy to the space medium and determines its applicability for the USCINCSpace. This paper recommends that the USCINCSpace adopt the use of the guidelines given by the geographic CINC model, as they are described in the US National Military Strategy, to shape the space medium.

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Chapter 1

Introduction

There is in every battlefield a decisive point the possession of which, more than any other, helps to secure victory by enabling its holder to make proper application of the principles of war.

— Antoine Henri Jomini, 1838

The increasing importance of space to both commerce and national security provides impetus for authors to explore all aspects of this area of study. The existing literature available on commercial and military space activities is abundant but lacks depth in addressing the issue of responsibility for the medium itself. This paper will by no means completely fill that gap but does seek to contribute to the literature by providing a method by which an American leader could shape the medium of space in ways that would be advantageous for the United States and its allies. The primary focus of this study is to present a methodology for exercising the political, economic, and military instruments of power in order to shape the space medium.

The term "shape" is derived from the vernacular found in the *US National Military Strategy of Shape, Respond, Prepare*.¹ Unfortunately, the document does not define the term *shape*, although it does outline a method of *how to shape* a geographic region. For the purposes of this paper, the definition of the term shape is *a constant process of using*

the instruments of national power in an area (region, medium, environment, etc.) in order to create conditions that are favorable to the United States. A subsequent chapter explains the derivation of this definition.

The President tasked the United States' Department of Defense (DoD) to protect the nation's interests in space. Specifically, the guidelines provided to the DoD by the President are:²

(a) DoD shall maintain the capability to execute the mission areas of space support, force enhancement, space control, and force application.

(b) In accordance with Executive Orders and applicable directives, DoD shall protect critical space-related technologies and mission aspects.

(c) DoD, as launch agent for both the defense and intelligence sectors, will maintain the capability to evolve and support those space transportation systems, infrastructure, and support activities necessary to meet national security requirements. DoD will be the lead agency for improvement and evolution of the current expendable launch vehicle fleet, including appropriate technology development.

(d) DoD will pursue integrated satellite control and continue to enhance the robustness of its satellite control capability. DoD will coordinate with other departments and agencies, as appropriate, to foster the integration and interoperability of satellite control for all governmental space activities.

(e) The Secretary of Defense will establish DoD's specific requirements for military and national-level intelligence information.

(f) The Secretary of Defense, in concert with the Director of Central Intelligence (DCI), and for the purpose of supporting operational military forces, may propose modifications or augmentations to intelligence space systems as necessary. The DoD may develop and operate space systems to support military operations in the event that intelligence space systems cannot provide the necessary intelligence support to the DoD.

¹ See General John M. Shalikashvili, *National Military Strategy of the United States of America: Shape, Respond, Prepare Now: A Military Strategy for a New Era* (Washington D.C.: Office of the Chairman, Joint Chiefs of Staff, 1997).

² See the Whitehouse, *Fact Sheet: National Space Policy* (Washington D.C., 19 September 1996) (sometimes referred to as the President's Space Policy). See also Department of Defense Directive 3100.10, *DoD Space Policy* (Washington D.C., 9 July 1999).

(g) Consistent with treaty obligations, the United States will develop, operate and maintain space control capabilities to ensure freedom of action in space and, if directed, deny such freedom of action to adversaries. These capabilities may also be enhanced by diplomatic, legal or military measures to preclude an adversary's hostile use of space systems and services. The U.S. will maintain and modernize space surveillance and associated battle management command, control, communications, computers, and intelligence to effectively detect, track, categorize, monitor, and characterize threats to U.S. and friendly space systems and contribute to the protection of U.S. military activities.

(h) The United States will pursue a ballistic missile defense program to provide for: enhanced theater missile defense capability later this decade; a national missile defense deployment readiness program as a hedge against the emergence of a long-range ballistic missile threat to the United States; and an advanced technology program to provide options for improvements to planned and deployed defenses.

A thorough understanding of all the requirements listed above help place the importance of space shaping efforts into the proper context. The US Air Force does not officially have the primary responsibility for the DoD space mission even though it spends 95% of the money allocated for space. The Air Force however, has come under attack recently for its "poor stewardship" of the space mission.³ Senator Bob Smith said many times, "Ultimately, if the Air Force cannot or will not embrace space power, we in Congress may have to establish an entirely new service."⁴ Evidently, Senator Smith is not the only member of Congress who feels that way. Congress has established a commission to review the need for a separate space force—their report is due in Fall 2000.⁵

³ Senator Bob Smith, "The Challenge of Space Power," *Airpower Journal*, Vol. 13, No. 2 (Spring 1999): 32-39.

⁴ *Ibid.*, 35.

⁵ The National Defense Authorization Act for FY 2000 established the Commission to Assess US National Security Space Management and Organization. The commission is currently being put together and is anticipated to include individuals such as former Secretary of Defense Donald Rumsfeld; former Senator Malcolm Wallop; former DUSD (Space) Bob Davis; former Science Advisor Bill Graham; retired Generals Howell Estes, Ronald Fogleman, Jay Garner, Chuck Horner, and Tom Moorman; and retired Admiral David Jeremiah. Their charter is to assess whether the United States' national security space efforts are

The United States military is in the early stages of a transition from using space assets to support combat operations on the surface of the earth to using space assets to conduct combat operations in space, from space, and through space.⁶ This transition is not occurring without a great deal of debate in both the military and political spheres about how this transition should occur. Fortunately, the current (1999) Unified Command Plan (UCP) outlines the responsibilities of the person who has the responsibility for shaping the space medium—the United States Commander-in-Chief for Space (USCINCSpace). Consistent with the direction given to the DoD by the President, the 1999 UCP outlines the USCINCSpace's responsibilities as:

- Missile warning
- Space surveillance
- Warning and assessment of space attack
- Advocating space operations
- Conducting space operations
- Planning for strategic ballistic missile defense and space-based tactical ballistic missile defense⁷

The traditional manner by which militaries prepare, deploy and employ force to achieve superiority in a geographic region is not directly applicable to space. This is especially true when it comes to force deployment. The President has directed the US military to control the space medium without the benefit of a specific plan for dealing with deployment issues in that medium. Given this dichotomy—the recognized importance of space in the strategic environment yet the limited ability to control the

effectively organized and managed. They are anticipated to evaluate alternative organizational models such as a separate space force (USAF model), a separate space corps (USMC model), and a major force program (USSOCOM model).

⁶ See Major General William R. Looney III, *Space Warfare: Not How But When?* Briefing given to the Air War College (10 Apr 2000).

⁷ See the *Unified Command Plan* (1999) and the *Draft UCP 2001* (Only unclassified portions used).

medium—how should the US military gain and maintain space superiority when directed? The answer lies in the shaping efforts of the USCINCSpace.

As space becomes increasingly important to the United States, two major concerns come to the forefront. The first is the vulnerability of United States space systems to disruption, as well as the ability to detect disruption, in the event of conflict (or during peacetime). Currently, if a United States satellite malfunctions, ground stations conduct numerous tests to determine the cause of the malfunction. Unfortunately, it is virtually impossible (without enemy acknowledgement) to determine if a space asset was either attacked, jammed, or merely struck by some form of space debris. The second major concern is that future adversaries will try to improve the performance of their military forces by developing indigenous space systems or by taking advantage of the widening array of space goods and services available in the marketplace.⁸ It is very easy for an enemy of the United States to buy the technology they need to build their own space systems or to lease them from other countries. In other words, these concerns are not technology-driven—these are what are known as "shaping issues." If shaping the medium of space is successful, the two major concerns over the vulnerability of United States assets and available technology become less severe as the threats may diminish.

The hypothesis suggested by this paper is relatively simple. By properly exercising the political, economic and military instruments of power, the USCINCSpace should be capable of shaping the medium of space in a way that is favorable to the interests of the United States. These shaping efforts would ensure a positive relationship with those who have a presence in space. The purpose of this paper is to provide United States

⁸ Frank G. Klotz, *Space, Commerce, and National Security* (New York: Council on Foreign Relations Paper, 1998), ix.

leadership (specifically USCINCSpace) a model for shaping the medium of space. This model is a variant of the one given to the geographic Commanders-in-Chief (CINCs) in the 1997 National Military Strategy as a guideline for shaping their regions. The applicability of the geographic CINC model is reviewed and suggested modifications are supplied in order for the model to be applicable to the medium of space.

Significance of this Study

The information revolution that is currently transforming both commerce and national security in the US depends upon services delivered from or through space. Any disruption of those services could have profound consequences for the United States. In May 1998, the American public saw a small example of these consequences firsthand when a technical problem on a single communications satellite (the Galaxy 4) shut down most paging systems across the United States and interrupted electronic funds transfers for some companies.⁹ A more extensive breakdown in satellite services, either accidental or deliberate, could wreak havoc upon important military, economic, and other societal activities.¹⁰ The 2000 Department of Defense Report to the President and Congress makes it very clear that,

Space power is as important to the nation as land, sea, and air power. Space forces support military operations by providing information lines of communication enabling information superiority, contributing to deterrence, increasing force effectiveness, and ensuring the freedom of space.¹¹

⁹ From the official "Statement of Chairman William Kennard on Galaxy 4 Satellite," *Federal Communications Commission Report* (Washington D.C.: Federal Communications Commission, 20 May 1998), 1.

¹⁰ Societal activities include everyday activities like listening to the radio or watching television that would be classified as annoying if lost.

¹¹ William S. Cohen, *Annual Report to the President and the Congress* (Washington D.C.: Office of the Secretary of Defense, 2000), 21.

United States space assets, along with their supporting ground stations and infrastructure, are potential target for enemies with the means to attack them. This is true for enemy space assets as well—they are likely United States military targets if war occurs. The idea that dependence on space capabilities has the potential to lead to space warfare should not come as a surprise. This possibility requires the United States to be able to protect its space assets (and those of its allies), and deny the use of space assets by potential adversaries. This responsibility lies with the DoD as outlined in the aforementioned Presidential guidance. By providing a basic construct for shaping the space medium, this paper provides insight into the potential methodologies that the USCINCSpace can use to better prepare US armed forces for conflict in the medium.

Thesis Roadmap

To address the question of how the USCINCSpace should shape his medium of responsibility (MOR), the model given to the geographic CINCs to shape their AORs is applied. In order to accomplish this task, the reader must first become familiar with some background information regarding shaping issues. Chapter 2 of this paper provides this background information.

The third chapter of this paper explains the geographic CINC model in detail while providing an analysis of the application of the model to the space medium. It shows how the concepts of promoting stability, preventing and reducing conflicts/threats, and peacetime deterrence all play a major role in shaping the space medium as they do in shaping geographic regions.

This study would be incomplete without an analysis of the many constraints placed on all CINCs in areas such as political, legal, economic, technological, and institutional

momentum of the US Air Force. Chapter 4 addresses these topics in detail. Having a clear understanding of the requirement for and constraints on the shaping efforts of the CINC, Chapters 5 and 6 provide conclusions and recommendations.

Limitations on Research

This paper is not technical in nature; therefore, there are not any discussions about specific types of space assets, especially weapons.¹² Also not addressed in this paper are the current hot topics such as National Missile Defense, a separate space force, force application, or the legitimacy issues tied to force application from space. They are topics that are worthy of independent assessment. Organizations and budgetary issues are only topically covered. The latest mission for USSPACECOM of computer network defense and attack will not be addressed in this paper either.¹³ The emphasis of this study is strictly on the concepts related to the shaping efforts of the USCINCSpace.

¹² For an excellent overview of space-based weapons see William Spacy's *Does the US Need Space-Based Weapons?* (Maxwell AFB, Alabama: Air University Press, 1999).

¹³ A recent study by the Secretary of Defense Strategic Studies Group showed that disgruntled employees cause significantly more problems with CND/CNA issues. Secretary of Defense Strategic Studies Group IV, *Premises for Policy: Maintaining Military Superiority in the 21st Century* (Final Report, 1999).

Chapter 2

Background

We must have control of space as we have control of the seas.

—General Bernard Schriever

The DoD currently tends to treat space as an information medium rather than a power projection medium.

—Senator Wayne Allard
Senate Armed Services Strategic Subcommittee Chairman

The purpose of this chapter is to provide background information on US national strategy, space policy, and cultural issues that affect the subject under study. From the warfighter's perspective, space capabilities are increasingly useful as force multipliers. Virtually every type of military operation, from small-scale conflicts to strategic nuclear war, depends on space capabilities.¹ The assertion that war will inevitably move to space has been a common theme among civilian and military leadership for some time.² The general consensus has been that the projection of war into space is inevitable with only technology and international restraints slowing the progress of developing policy and doctrine. As a result of these assertions, shaping the space medium is rapidly becoming a

¹ Major Ed Wilson, *Securing the Heavens: A Perspective on Space Control* (School of Advanced Airpower Studies Thesis, Air University, June 1999), 5.

² See the Aspen Strategy Group's *Anti-Satellite Weapons and US Military Space Policy* (Washington D.C.: The Aspen Institute for Humanistic Studies and University Press of America, 1986) and General Howell M. Estes, *Address to the Air Force Association Annual Symposium* (Los Angeles, California: 18 October 1996).

necessity prior to and during modern warfare. It is essential for the reader to understand the derivation of the definition of the term "shape," so it is presented in this chapter as well.

United States National Strategies

The concept of shaping the space medium has been interjected into US national strategy and policies for some time. The 1997 *US National Military Strategy* was built on the premise that the United States would remain globally engaged to shape the international environment and create conditions favorable to United States interests and global security.³ As a result, there was no reason not to believe that the United States had intended to shape the medium of space as part of its international shaping efforts.

The new (December 1999) *National Security Strategy* contains much stronger language regarding space than previous editions. It clearly states that the United States is committed to maintaining its leadership in space, that the United States will have unimpeded access to and use of space, and finally that the United States will deter threats to its space assets.⁴ Although this new language may sound threatening to a potential adversary, it is not very new. The United States declared that it would counter space systems that pose a threat to its interests in Air Force Manual (AFM) 1-6, *Military Space Doctrine*, published in 1982. Specifically AFM 1-6 stated that the United States "will pursue activities in space in support of its right of self-defense."⁵ Although this manual's

³ General John M. Shalikashvili, *National Military Strategy of the United States of America: Shape, Respond, Prepare Now: A Military Strategy for a New Era* (Washington D.C.: Office of the Chairman, Joint Chiefs of Staff, 1997), 25.

⁴ The White House. *A National Security Strategy for a New Century* (Washington D.C., December 1999), 12.

⁵ Department of the Air Force, AFM 1-6, *Military Space Doctrine* (Washington D.C., 15 October 1982), 3.

utility has expired, the concepts within it are carried on today in many documents dealing with national security.⁶

DoD Space Policy

The DoD Space Policy clearly delineates that "space is a medium like the land, sea, and air within which military activities shall be conducted to achieve United States national security objectives."⁷ This concept has been reiterated in the 2000 DoD Annual Defense Report to Congress.⁸ This statement however, does not necessarily mean that space should be designated as a CINC's area of responsibility (AOR) or even as a region (which also has no official definition). These terms carry with them many implications regarding the responsibility of a CINC, the least of which would be the question of who is really in charge of a particular region. If space really is a medium like the land, sea, or air, then why isn't the USCINCSpace considered a "regional" or "geographic" CINC (a CINC with an area of responsibility)? According to Joint Publication 1-02, an area of responsibility is a "geographical area associated within a combatant command within which a combatant commander [CINC] has authority to plan and conduct operations."⁹ This issue is complicated for USCINCSpace as he is considered to be a combatant commander according to Joint Publication 3-33, but not a regional or geographic CINC.¹⁰

⁶ For instance the *National Security Strategy*, the *National Military Strategy*, the *National Space Policy*, and the *USSPACECOM Long Range Plan*.

⁷ DODD 3100.10, *Space Policy* (Washington D.C.: Department of Defense, July 9, 1999), Section 4.1.

⁸ William S. Cohen, *Annual Report to the President and the Congress* (Office of the Secretary of Defense, 2000).

⁹ JP 1-02, *Department of Defense Dictionary of Military and Associated Terms* (Washington D.C.: Department of Defense, May 1994).

¹⁰ Department of Defense, *Joint Forces Capabilities* (Washington D.C.: Department of Defense, 1999).

Space as an AOR

Whether or not space is an area of responsibility (AOR), and therefore USCINCSpace should be a regional CINC, is an extremely complicated and political issue. Because space is not a "geographical area" it does not meet the criteria of a region. That would be an easy definition to change, but to do so would require the Air Force to acknowledge the fact that space is a separate medium from air and would counter to USAF emphasis on aerospace integration (although *DoD Space Policy* makes that clear). This in turn might allow another service to acquire parts of the Air Force space mission, which would in turn mean a shift of funds and personnel to them. This issue will be discussed further in a section that follows, but should be more fully developed in another study.¹¹

"Shape" Defined

As the National Military Strategy is built on the three pillars of *shape*, *respond*, and *prepare*, it is very important at the outset to understand exactly what the term "shape" actually means. The 633-page *Department of Defense Dictionary of Military and Associated Terms* (JP 1-02) does not provide a definition for the term "shape."¹² According to the Director of US DoD and NATO Terminology (who authored JP 1-02), the term shape was left deliberately imprecise in order to allow the geographic combatant commanders flexibility in how they shape their regions. This idea was later confirmed by

¹¹ See Paul L. Bailey's "Space as an AOR," *Airpower Journal*, Vol. 12, No. 4 (Maxwell AFB, Alabama: Air University Press, Winter 1998), 81-88.

¹² Department of Defense, *Department of Defense Dictionary of Military and Associated Terms* (Washington D.C.: DoD, May 1994).

the office (J-5) that authored the National Military Strategy.¹³ Many could argue for or against different definitions for the term "shape," but one must be chosen as a baseline for this paper. Therefore, for purposes of this paper the term "shape" is a deliberately imprecise term defined as:

a constant process of using the instruments of national power in an area (region, medium, environment, etc.) in order to create conditions that are favorable to the United States.

Given this definition, it is also assumed, for the purposes of this paper, that given the prospect of increasing international competition in space, USSPACECOM should be the lead agency to try to shape the space environment to the advantage of the US and its allies. For example, one method of doing this is by using a strategy of mutual dependence, which requires all spacefaring nations to contribute and cooperate for mutual benefit. This should deter aggression and foster enduring relationships that will keep the space medium well shaped. This concept will be expanded in Chapter 3.

Aerospace

The term "aerospace" has emerged in the Air Force's lexicon to mean the vertical dimension encompassing both air and space as a seamless medium.¹⁴ As alluded to earlier, the reasons for the Air Force embracing this concept may not be exactly noble.¹⁵ Some in the Air Force would argue that the reason for embracing the "seamless medium"

¹³ Although no one in the DoD (that I can find) would confirm or deny this, it seems very clear that no one is officially willing to take on the issue of defining the term "shape." Telecon with J-5, 17 Feb 00.

¹⁴ See USAF, *The Aerospace Force: Defending America in the 21st Century* (Washington D.C.: Department of the Air Force White Paper, 2000).

¹⁵ In the 1996 Corona meeting of the Air Force's senior leaders, the integration of air and space was viewed as a method by which to guarantee continued Air Force stewardship of space. See, Cynthia McKinley, "The Guardians of Space: Organizing America's Space Assets for the Twenty-First Century," *Aerospace Power Journal*, Vol. 14, No. 1 (Maxwell AFB, Alabama: Air University Press, Spring 2000), 39.

concept has to do with effects-based targeting.¹⁶ This means it doesn't matter where the mission is conducted (air or space) as long as the result is the same. For example, a U-2 aircraft, an unmanned aerial vehicle, or a satellite could provide reconnaissance coverage of a target area.

Of course, the concept of a seamless medium is directly in contrast with the DoD policy for space, which clearly says space is a medium unto itself. The seamless medium concept is also not accepted by all in the Air Force; as former USCINCSpace General Estes recently said, "It must be made clear that space is becoming, or some would say, space has become the 4th medium in which the military will operate in the protection of our national security interests. This is not a surprising development nor should it be either feared or welcomed—it is simply a fact."¹⁷ This fact is not so simple, and it presents significant impediments to shaping the space medium when the service whose leadership controls space can't come to an agreement among its leadership on exactly how the medium should be defined. With the service's fly-and-fight self-image, a degree of friction has always existed between the Air Force's air and space cultures. At the heart of this discord is the fact that today's space capabilities remain outside the Air Force's sense of identity.¹⁸ This problem is a source of great consternation among the service and a good topic for another study.

¹⁶ On 15 March 2000, the Air Force Doctrine Center presented a briefing to ACSC students explaining their theory of effects-based targeting as justification for a seamless medium.

¹⁷ General Howell M. Estes, Commander, US Space Command, Address, (Air Force Association Annual Symposium, Los Angeles, CA, 18 October 1996).

¹⁸ Cynthia McKinley, "The Guardians of Space," 38.

Chapter 3

Applying the Geographic CINC Model

Space is a realm in which many military operations are conducted more efficiently than by terrestrial systems. Military satellites have been operating in space for more than twenty years, and our accomplishments in DESERT STORM emphasizes that space has unquestionably evolved as a military theater of operations.

—Gen Charles A. Horner
Testimony before the Senate
Armed Services committee, 22 Apr 93

The purposes of this chapter are to first to explain the geographic CINC model for shaping as it is outlined in the National Military Strategy, and second to explain how that model can be applied to shaping the space medium. These explanations are parallel in nature, so as each part of the model is described, its corresponding application to the space medium will be described as well.

According to the US National Military Strategy, geographic CINCs shape their areas of responsibility by promoting stability, preventing and reducing conflicts and threats, and through peacetime deterrence.¹ Geographic CINCs are to conduct their shaping operations using all available instruments of national power, including economic and political—not just military—means.

¹ General John M. Shalikashvili, *National Military Strategy of the United States of America: Shape, Respond, Prepare Now: A Military Strategy for a New Era* (Washington D.C.: Office of the Chairman, Joint Chiefs of Staff, 1997), 4.

It is generally accepted that regional stability and deterrence are determined in large part by a potential enemy's perception of US capabilities and commitment.² These capabilities and commitment in a region are demonstrated to potential enemies by the US's ability to bring military power to bear. It is also critical that the US government clearly communicate US intentions in the area. Clear communications increase the level of understanding between the US and a potential enemy. This helps to reduce uncertainty, to build security relationships, and potentially promote the development of democratic governments. All these activities conducted together are what help the US keep many countries from becoming tomorrow's adversaries.³ The model given to the CINCs by the Chairman of the Joint Chiefs of Staff (CJCS) contains three parts: promoting stability, preventing and reducing conflicts and threats, and peacetime deterrence. These same shaping activities can be applied to space. As the space medium is the newest "region" where the US needs to promote stability a model for shaping the medium is called for. Since no such model exists, this chapter will demonstrate the application of the geographic CINC's shaping activities as a model for shaping the medium of space.

Promoting Stability

Through peacetime engagement activities, US military forces have the ability to promote geographic stability, increase the security of allies, build coalitions, and ensure a more secure global environment.⁴ However, what happens when that region extends

² General John M. Shalikashvili, *National Military Strategy of the United States of America: Shape, Respond, Prepare Now: A Military Strategy for a New Era*, 11.

³ Ibid., 12.

⁴ Ibid., 11.

beyond the globe? The commanders-in-chief of US unified commands, based on guidance from the National Command Authority (NCA) and CJCS, develop plans and employ forces and personnel in peacetime to protect and promote US interests and geographic security objectives. Geographic CINCs have the option to (and typically do) employ forces and other personnel in peacetime to protect and promote US interests and regional security objectives. Examples of this are the US troops in South Korea, Bosnia, and Kosovo.

Through other engagement activities, such as information sharing and a wide range of contacts between the US military and the militaries of other nations, the US can promote trust and confidence while increasing the security of allies. Programs such as Partnership for Peace, defense cooperation activities, foreign military sales, and the International Military Education and Training (IMET) program establish long-term professional relationships between US armed forces and the future military leadership of other countries. "Military-to-military contacts with countries that are neither staunch friends nor confirmed foes build constructive security relationships, help to promote the appropriate role of armed forces in a democratic society, and enhance stability."⁵

Building Coalitions

In the area of space, the US is actively pursuing military and non-military programs to build coalitions through both the Mir/Shuttle program and the International Space Station. Over 45 foreign astronauts (excluding US astronauts and Russian cosmonauts)

⁵ General John M. Shalikashvili, *National Military Strategy of the United States of America: Shape, Respond, Prepare Now: A Military Strategy for a New Era* (Washington D.C.: Office of the Chairman, Joint Chiefs of Staff, 1997), 14.

have been on the Russian Space Station Mir and Space Shuttle.⁶ Although these relationship-building programs were developed under the purview of the National Aeronautics and Space Administration (NASA), there is no reason to think they can't be used as pathfinder programs for future coalition development models. The USCINCSpace has not been actively involved in these programs thus far. These types of programs build positive relationships with those countries that have, or will have, the capability to use the space medium. As more and more countries fall into that category, the USCINCSpace could encourage their participation in such international space programs.

The USCINCSpace, however, does have internal offices that specialize in international relations. These offices help facilitate coalition building through their daily activities. These offices are actively involved in coordinating such areas as shared early warning and joint national missile defense programs with Russia. Expanding the function of these offices to include coordination with NASA's international relations office could potentially encourage more nations to be involved in global programs. It may also reduce duplication of effort among the offices.

CINC Plans

The Deputy Director for Strategy and Policy (DDS&P) is the focal point in the DoD of strategic planning for the US armed forces.⁷ In part, the director satisfies this responsibility by developing the *National Military Strategy*. In conjunction with this strategy, the directorate provides advice for planning and programming guidance and

⁶ See www.nasa.gov for the latest update.

⁷ *Strategy and Policy: Reshaping Strategy to Shape the Future* (Washington D.C.: The Joint Staff, Strategic Plans and Policy (J-5)), www.dtic.mil/jcs/core/strategy.html.

recommends inputs to the Secretary of Defense in preparation of his contingency planning guidance. An example of the Directorate's work in this regard is the development of *Theater Engagement Planning*, a strategic planning system that parallels the existing deliberate planning process for contingencies. With the advent of "Shape, Respond, Prepare Now" as the cornerstone of the National Security and National Military Strategies, the priority accorded military activities designed to "shape" the strategic environment was elevated to the same high priority as crisis response and force modernization. Theater Engagement Planning provides the vehicle to plan for and implement the new "shaping" strategy.⁸

The *Unified Command Plan* requires each geographic combatant commander to develop individual plans for shaping his or her region. This *Theater Engagement Plan* (TEP) is based on guidance from the NCA and the CJCS. Even though the USCINCSpace, as a functional command, is not required to provide a TEP, the USCINCSpace's Space Policy office is currently producing a *Global Theater Engagement Plan* (GTEP). This plan discusses how the USCINCSpace will support each geographic CINC rather than how he will shape the space medium and how these shaping activities will affect each terrestrial region.⁹ The GTEP is intended to bring the "shaping" element of the US National Military Strategy fully into the arena of deliberate planning and national-level oversight. It is supposed to do this by providing the CINC with better insight into how his own processes fit into the worldwide shaping efforts of the US. However, one area that is lacking in both of these documents is the role the International Space Station and the Space Shuttle may play in the CINC's shaping efforts.

⁸ Ibid.

United States Space Command (USSPACECOM) has taken an important step in articulating a vision for the year 2020 and developing a long-range plan for implementing that vision. Both the *USSPACECOM Vision* and its *Long Range Plan* address the vital contributions that space systems make toward enhancing U.S. national security and achieving national objectives. Moreover, based on the vision's concept of how military space strategy will evolve in the 21st century, the Long Range Plan integrates space into military planning in order to accomplish the vision for 2020. It also provides direction not only for USSPACECOM and its components, but also recommended actions for other organizations. These organizations include the military services and the commercial space industry. Many of the goals and approaches laid out in both the *Vision* and the *Long Range Plan* may not be achievable unless other decisions and actions are made outside USSPACECOM's purview; these include changes to existing policies, treaties, and legal commitments to which the United States is a partner. The importance of shaping the space medium becomes more obvious if these changes do not occur. Chapter 4 discusses the details of the aforementioned constraints.

Employing Forces

Peacetime military engagement, however, does not supplant the core requirement to have a military capable of deterring and, if necessary, defeating large-scale, cross-border aggression in multiple theaters. The defense of American lives, territory, and interests is the cornerstone mission of the US armed forces.¹⁰ This is where space lacks a leadership role. There are no "forces" employed in space, nor are there (as far as we know) weapons

⁹ General Richard Myers, USCINCSpace, *Written Testimony Presented to the Senate Armed Services Committee* (Strategic Forces Subcommittee, 22 March 1999).

deployed in the medium. This represents a major difference between geographic combatant commanders and the USCINCSpace. However, if one views US satellites as automated diplomats, then the USCINCSpace does indeed have employed forces or a "presence" in space.

The USSPACECOM *Vision for 2020* and its *Long Range Plan* offer a view of the future security environment that includes projected growth in globally available markets in telecommunications, imagery, entertainment, personal computing, the Internet, and navigation. Furthermore, the vision for 2020 and the *Long Range Plan* point to the fact that potential US adversaries will also share access to space-based capabilities. Having capabilities such as navigation, weather, reconnaissance and communications will give potential adversaries sophisticated regional situational awareness before hostilities. The implications drawn from the *Long Range Plan* are that USSPACECOM will be called upon to conduct space operations to protect US investments and commercial assets, in addition to securing other U.S. national interests in space.

Given the global access to space-derived information and the critical implications of this for US national security, the United States must be prepared to ensure space superiority over an enemy. Space superiority is defined as basically complete control of the space medium. In a recent letter to the US President, several retired general officers wrote that the President should heed the recommendations made by the Congressional Mandated National Defense Panel to assure an American capability to "deny our enemies the use of space."¹¹ The issue of denying our enemies the use of space leads one to the

¹⁰ General Henry Shelton, CJCS, *Posture Statement Before The 106th Congress Committee On Armed Services* (United States Senate, 8 February 2000).

¹¹ National Defense Panel, *Transforming National Defense: National Security in the 21st Century* (Washington D.C., Government Printing Office, December 1997).

issue of space control. Space control is defined as the means or methods by which space superiority is gained and maintained. In an Aspen Group study, several conclusions were drawn regarding the issue of controlling space.¹²

According to the Aspen Group Report, making US space control policy promises to be a difficult task for American leadership during the next decade because of technological and political issues that must be resolved. The report places emphasis on the value of maintaining the limited existing space control capability while arguing that there are risks in pushing the development of space controls too far or too fast. It also highlights the need for a more robust satellite protection program while suggesting that even substantial improvements in this area will not endure over the long term in the face of an unrestricted threat.

Some participants in the public debate over space control favor approaches that push US policies either toward the one extreme of the complete weaponization of space or the other (status quo). Many congressional, academic, and military participants in the debate believe that the idea of combining elements of space control capability with arms control simply will not work.¹³ Those who hold this position argue variously for banning current space controls such as shutter control¹⁴ or for dropping any efforts at restraint, on the grounds that a mixed approach will forfeit important security interests. This debate is approaching the point of stalemate in that little progress is being made in either direction.¹⁵ Some participants in the space control debate ask the question of whether the

¹² Aspen Strategy Group, 34-38.

¹³ Ibid., 39.

¹⁴ Shutter control is the ability to turn off US reconnaissance or surveillance satellites (commercial or military) by ground control.

¹⁵ Aspen Strategy Group, *Anti-Satellite Weapons and US Military Space Policy*, 37.

United States already has complete control of space. The answer goes back to the Gulf War.

Like air power in the First World War, space power in the Gulf War was viewed by most as an auxiliary that supported the main action.¹⁶ Space power advocates, on the other hand, argue that the Gulf War validated the accomplishments of their satellite systems and were not just an auxiliary part of the war. The Global Positioning System (GPS) was critical to the conduct of the war despite the fact that it was not yet a fully operational system (only 16 of the 21 planned satellites were in orbit).¹⁷ The criticality of the system was demonstrated by the fact that Coalition forces in the Gulf War used over 12,000 hand-held GPS receivers.¹⁸ Defense Meteorological Satellite Program satellites furnished high-resolution, near-real time meteorological information in the midst of the worst weather in the Persian Gulf in fourteen years. At the same time, Defense Satellite Communications System satellites provided in-theater and inter-theater secure communication.¹⁹ Defense Support Program satellites scanned for and reported bright infrared events such as the exhaust plume glow from *Scud* launches. Two civilian satellite systems also provided the US (and sometimes Coalition partners) with imagery: the US LANDSAT and the French SPOT (Système Probatoire d'Observation de la Terre).²⁰ Like their air-breathing counterparts at the end of World War I, spacepower advocates left the Gulf War with a vision of what their systems could provide to the nation given the technology and the political will to turn the vision into reality.

¹⁶ Richard P. Hallion, *Storm Over Iraq* (Washington D.C.: Smithsonian Institution Press, 1992), 313.

¹⁷ *Ibid.*, 314.

¹⁸ Peter Anson and Dennis Cummings, "The First Space War: The Contribution of Satellites to the Gulf War," in Alan D. Campen (ed.), *The First Information War* (Fairfax, VA: AFCEA International Press, October 1992), 127.

¹⁹ Richard P. Hallion, *Storm over Iraq*, 314.

Exercises and Information Sharing

The US international exercise program is an activity that clearly promotes stability. Exercises enhance both interoperability with allies and US readiness. They also demonstrate the US's ability to form and lead effective coalitions. Exercises and information sharing help demonstrate US capabilities and resolve to friends and potential adversaries alike. Exercises provide realistic conditions for working with the shared technologies, systems, and operational procedures that will be used in times of crisis. International exercises also provide geographic familiarity while information sharing fosters an understanding of cultures, values, and habits of other societies. Exercises encourage burden sharing on the part of friends and allies, and facilitate regional integration.²¹ The USCINCSpace's international relations division facilitates this type of activity and contributes greatly to the CINC's shaping efforts. Participation in exercises such as Global Engagement, Joint Experiment 2000, and in an increasing number of wargames is also a critical part of the shaping effort.

Foreign Military Sales

In most military technological revolutions, the forces of progress have been unstoppable, because while some states may have had an interest in preserving the status quo, others correctly or incorrectly saw in the new wave of military technology the chance to increase their relative power.²² Either way, the US must determine the validity in selling critical space technologies to allies as they may end up in enemy hands. As a

²⁰ Thomas A. Keaney and Elliot A. Cohen, *The Gulf War Air Power Survey Summary Report* (Washington, D.C.: U.S. Government Printing Office, 1993), 194.

²¹ General John M. Shalikashvili, *National Military Strategy of the United States of America: Shape, Respond, Prepare Now: A Military Strategy for a New Era*, 16.

²² Karl Mueller, *Space Weapons and US Security: The Dangers of Fortifying the High Frontier*, (Paper presented to 1998 Annual Meeting of the American Political Science Association, September 1998).

part of his shaping efforts, the USCINCSpace should play a role in the decision process used to determine which allies receive the space technologies provided in foreign military sales. This function is no different from the standard role of the geographic CINC.

Preventing and Reducing Conflicts and Threats

Conflict prevention means the reduction, mitigation, or neutralization of the causes of conflict.²³ It is rare for the military to be called upon to address the root causes of a particular conflict. Major conflicts generally arise from political, economic, social, and legal conditions that are well beyond the core competence of the military as an institution. What the military can provide to help civil initiatives succeed are some degree of security and the military's unique operational and logistical capabilities. This type of military support can have important strategic value if it promotes the stability the US is seeking in a particular region.²⁴ The sections that follow explain the applications in shaping the medium of space.

Reduction of the Causes of Conflict

The probability of a threat from space seems to be increasing almost daily. Almost, if not all, nations on earth use space products in some way, from weather broadcasts and telephone communications to earth resources images for farming and disaster relief. In an increasingly cellular age, individuals have become users of space communications and navigation space systems. Over forty nations have some type of space program office within their government. Many also have private or university space programs including communications run by either government or private firms. Some of these nations have

²³ Karl Mueller, *Space Weapons and US Security: The Dangers of Fortifying the High Frontier*, 5.

²⁴ General John M Shalikashvili, 17.

no space assets or space industry; however, recognizing the importance of space systems, these nations have programs to use space for the benefit of their countries and their people. Many countries, while not having a national space program, take part in international or multi-national space organizations.²⁵ The United States has the honor of being the premier provider of space science and technology; space-based precision positioning and timing, communications, remote sensing, missile warning, and surveillance of space. As the international community realizes economic gain by using these services, a stabilizing interdependence could form dissuading others from developing similar capabilities that could be used in a hostile manner. Cooperative programs, led by the US, can help reduce causes of conflicts.

Mitigation of the Causes of Conflict

Because information is increasingly gathered by and transmitted through space systems, success in future conflicts could very well depend upon the ability to shut off (perhaps only temporarily) an adversary's ability to obtain and use space products and services. The possible means of accomplishing this particular task are quite varied. The overall mission of protecting satellites and denying their use to adversaries—noted earlier as space control—actually entails several interrelated activities and objectives. These include assuring access to space and the ability to operate there; surveilling objects in space; protecting space systems from attack; preventing unauthorized access to or use of friendly systems; and negating space systems that pose a risk to US and allied interest. Significantly, all of these objectives can be achieved by nonmilitary means, including even the denial or "negation" task.

²⁵ Programs of this type include, Intelsat, Inmarsat, Arabsat and others.

For example, licensing agreements have been formulated to give the US government a say in the distribution of satellite products in the event of crisis or conflict. Similarly, export control regimes—such as those established for missile technology and chemical weapons precursors—can be instituted on a multilateral basis to restrict the flow of satellite technology and products to suspect states. Finally, the United States can make use of traditional tools of diplomacy to persuade state actors or multinational consortia to refrain from providing satellite communications services or imagery to an adversary.²⁶ These techniques are important to the overall object of mitigating the causes of conflicts.

Neutralization of the Causes of Conflicts

Some day an adversary is going to attempt to neutralize US space assets.²⁷ That day may not be far into the future. As a result, the US will need to develop neutralization methods of both space-based and ground-based attack mechanisms. Given the difficulties in deploying space-based weapons, or even a missile defense system, the US military space policies should be structured around the following six priorities:²⁸

1. Expand satellite survivability measures.

Improving the durability and redundancy of US satellite networks, communications links, and ground control facilities should be the highest priority of US space policy—but it is not. The high degree of public support given to the survivability issue within the policy community in recent years should not be taken to mean that the funding of major programs is a foregone conclusion. In fact, the lack of adequate funding remains a

²⁶ Frank G. Klotz, 32.

²⁷ Perhaps the best writing on this subject that provides extensive detail of the circumstance under which this may occur is Michael Baum's "Defiling the Altar: The Weaponization of Space" found in the *Airpower Journal*, Vol. 10, No 2. (April 1994), 15-22.

²⁸ Aspen Strategy Group, 34-38.

serious problem when space program have to compete with such "air" programs as the F-22. Complacency is easy in the face of threats that have yet to fully materialize, much less to be tested in conflict situations. Other than the recent Kosovo campaign, the US sees no discernable threat in its future. US survivability programs must aim not only to defeat the option of easy (inexpensive) attacks, but also to ensure that US satellites are capable of surviving all but the most massive threats in performing their missions.

2. Reduce reliance, wherever possible, on spacecraft that are inherently vulnerable.

The logical counterpart to US satellite survivability efforts must be to discourage over reliance on spacecraft whose operational characteristics render them vulnerable (or too difficult to protect at reasonable cost). Although potentially expensive, in some cases the best way to offset such vulnerability is simply to have adequate numbers of spares on-hand to replace lost assets in wartime situations. However, alternative platforms to carry out data relay, reconnaissance, and navigation missions should also be developed, especially for support of US forces deployed in regional conflicts. Since attacks on satellites are most likely to occur in major conventional conflict, and since satellites are unavoidably a "global" capability (and therefore needed for other purposes), the US has a strong interest in developing dedicated airborne and ground-based alternatives to satellites for in-theater operations.

3. Maintain capabilities to attack threatening satellites in low earth orbits.

Just as the US would attempt to defeat enemy terrestrial or airborne reconnaissance platforms in wartime situations, it needs a reliable means to attack enemy targeting satellites that would direct fire against US conventional forces. The gains to US security in pursuing this capability are greater than the costs incurred by ceding a similar option to

the enemy. However, the means chosen should be cost-effective (i.e., cheaper to deploy than to counter), versatile in the sense of providing adequate coverage of important targets, and tailored to US interests in deterring programmatic responses on the enemy side that would substantially escalate the space control threat beyond low orbits.

4. Prevent "quick kill" threats to high altitude satellites.

At high altitudes, US interests weigh heavily in favor of suppressing all development of space control capability. The US has a considerable stake in staving off risks to communications and missile-warning satellites that afford both sides a critical margin of time to act (and react) rationally during crises. US safeguarding efforts should be based primarily on independent initiatives—such as the hardening of sensors and communication links, deploying back-up systems, and moving certain satellites (like the new MILSTAR communications satellite) to polar or supersynchronous orbits. Nevertheless, certain limits on kinetic energy and beam weapons could, if properly implemented, help to reduce the threat of prompt or instantaneous attack potential and reinforce the beneficial effects of survivability measures at all altitudes.

5. Negotiate rules-of-the-road agreements.

The US should begin negotiations with the other space-faring nations on a joint framework for "rules-of-the-road" for space activities. These rules would strengthen existing prohibitions against satellite attack in peacetime, ban close trailing and simulated attacks on the other side's satellites, govern "fly-by" maneuvers, and establish keep-out zones at the geosynchronous orbit. To support this arrangement, both sides would also establish a consultative channel to oversee implementation, to clarify ambiguous space activities, and handle periodic review procedures. Consistent with U.S. law, a framework

for these rules could be negotiated in the form of an executive agreement along the lines of the "Incidents at Sea" accord and, if necessary be, tailored to any subsequent limitations directly imposed on space control capability.²⁹

6. Improve US space-tracking and surveillance capabilities.

Finally, the US must invest greater resources in programs to improve space surveillance capabilities. The growing number of active satellites, especially at geosynchronous and (soon) at supersynchronous altitudes, is going to impose increasing demands on the ability to detect, to interpret, and to react quickly to threatening events. If agreed rules of behavior or other measures come into force, the US will need a greater capability to characterize satellite locations and activities. In the near term, the US can improve surveillance by equipping satellites to monitor other spacecraft deployed in (or passing through) their vicinity. The US should also step up efforts to develop long-wave-infrared technologies to meet space-tracking needs at very high orbits.

Arms Control

The geographic CINC can make an effort to prevent conflict and reduce threats via arms control measures within his AOR. Verifiable arms control agreements, as well as confidence building and transparency measures, help reduce tensions and dangers in a geographic region. Military resources are an important component of this effort, particularly in the conduct of reciprocal inspection, verification, and, in some cases, enforcement activities. The USCINCSpace uses space assets (specialized satellites) to help with this very important verification process. Although currently not a part of USCINCSpace's purview, helping the geographic CINC bring worldwide arsenals into

²⁹ Aspen Strategy Group, 36.

conformity with international nonproliferation standards helps to shape the international environment. This reconnaissance mission is becoming more and more important as the concern over the proliferation of weapons of mass destruction permeate the agendas of the US Congress.

One example of "arms control" has been bringing pressure to bear on individual governments to restrict the activities of their domestic companies in the sale and distribution of remote sensing products. Lobbying by the Israeli government is widely credited with convincing the US Congress to specifically prohibit companies licensed by the American government from selling images of Israel that are of higher resolution than is available from non-US commercial sources.³⁰

Using Military Operational and Logistical Capabilities to Assist Civilian Programs

In geographic regions, the military can assist civilian humanitarian assistance programs with such assets as airlift. Applying the use of military assets to assist such civilian programs in the space medium is difficult. The unique operational and logistical capabilities the USCINCSpace can offer another country vary from space expertise to actual spacelift support to providing actual space launch vehicles. The US, however, may not be able to stand the economic impact of providing space launch vehicles to another country. Also, considering the very large backlog of payloads waiting to be launched in the US, the idea of providing any type of support to another country in this area seems unrealistic. To a smaller degree however, the US does try to provide assistance in space technology development for underdeveloped nations as often as economically and politically possible. An example would be a country getting an experiment conducted for

³⁰ Klotz, 38.

them during a Space Shuttle on-orbit mission carried out by American astronauts or the worldwide use of the US Global Positioning System (GPS).

Peacetime Deterrence

Regional deterrence means preventing potential adversaries from taking aggressive actions that threaten US interests in that region. The CJCS considers peacetime deterrence to be the military's most important contribution to the shaping element of the President's National Security Strategy.³¹ Geographic CINCs accomplish deterrence through demonstrated military capabilities. A critical part of US shaping efforts are 1) the US demonstrating military abilities and 2) US willingness to defeat potential adversaries while denying them their strategic objectives. US deterrence capability gives allies the confidence necessary for normal political discourse and peaceful resolution of differences. The National Military Strategy identifies four elements of conventional warfighting capabilities as critical. They are: forces and equipment being strategically positioned; the capability to rapidly project and concentrate military power worldwide; the ability to form and lead effective military coalitions; and the capacity to protect the US homeland, forces, and critical infrastructure from the full range of potential threats. Space plays an important role in all four of these critical capabilities.

Forces and Equipment Strategically Positioned

Having forces and equipment employed in space for peacetime deterrence may seem like a good idea to some, but to others the idea is a politically unacceptable. Having the ability to deploy weapons in space may serve as deterrent enough for the weapons to be

considered strategically positioned. Some would like to use the concept of space control to serve the need for employing forces and equipment. Space control entails both free access to space and the ability to deny this access to a potential enemy.³² One must remember, however, that control does not necessarily yield deterrence.

In discussing the role of the military shaping the space medium, the term weaponization comes to mind. This term implies a capability to conduct warfare in, from, or through space. It is more appropriate to use the term weaponization rather than militarization because the United States, Russia and China (to name a few) have already militarized space. Since the earliest days of US involvement in space, intelligence and communications satellites have had military missions.

While space has not been overtly weaponized yet, there are historical reasons for concluding that the weaponization of space is as inevitable as was the weaponization of the land, sea, and air as a means of warfare. Study of these other environments shows that although the initial involvement in the land and sea was for commerce, the militarization and ultimate weaponization of each occurred because of the belief that it was necessary to protect resources in these environments. In the case of air, for example, protecting bombers was required. It is for this reason that the causes for the weaponization of these environments have a relevant carry-over to the space medium. Choosing the sea for another example, as dependence on and vulnerabilities of sea lines of communication increased, the need for military power evolved. As with the case of the sea, growing importance and vulnerability of space systems may produce conflicts

³¹ General John M. Shalikashvili, *National Military Strategy of the United States of America: Shape, Respond, Prepare Now: A Military Strategy for a New Era*, 10.

³² USSPACECOM, *Long Range Plan* (1999), 15.

and those conflicts will necessitate the need for the US to control space.³³ The US military is presently very dependent on space assets for the conduct of war. Intelligence, surveillance and reconnaissance, strategic and theater level warning, weapon guidance, communication, command and control, and environmental monitoring functions are all migrating to space.³⁴ It should be acknowledged that there is a small group of individuals who disagree with this linear analogy between sea, air and space but an in-depth analysis of space weaponization is for another study.³⁵

Control of space is not only important to ensure access to satellites, but to support military operations on the earth as well. Just as control of the air is a precursor to effective operations on the land or sea, control of space is a prerequisite to effective (based on US standards) operations in all environments (land, sea, and the air). Any disruptions to military access to space could jeopardize American military activities since reliance on space assets is increasingly becoming a strategic vulnerability for the United States. Therefore, having forces and equipment strategically positioned is just as important in space as it is in the geographic regions.

Rapidly Project and Concentrate Military Power

The idea of rapidly projecting and concentrating military power in space is difficult to achieve. The US does have offensive counterspace capabilities called the five D's. Deception, disruption, denial, degradation, and destruction of space assets or capabilities are within the purview of the US military.³⁶ Exactly how the five D's are executed (such

³³ Thomas D. Bell, *Weaponization of Space: Understanding Strategic and Technological Inevitabilities*, (Occasional Paper No. 6, Center for Strategy and Technology, MAFB, AL, January 1999), 22.

³⁴ Briefing by USAF Long-Range Plans Division on *Global Engagement: A Vision for the 21st Century Air Force* (Washington, D.C.: 1996).

³⁵ Karl Mueller, *The Phantom Menace: Assessing the Threats to American Interests in Space*.

³⁶ USSPACECOM, *Long Range Plan* (1999).

as the Global Precision Optical Weapon or Spears from Space) are for another discussion. Launch scheduling, as well as satellite production, to meet any immediate requirement for space is almost unheard of under today's budget constraints and is unlikely to change in the future. The closest the US came to "surging" launch and satellite production was during the Gulf War when the Air Force launched one Delta II GPS package every six weeks.³⁷

An alternative to rapidly projecting (launching) satellites would be to launch them in advance and hide them. Hiding satellites in very high or unusual orbits may be an effective alternative to launch on demand, but the operational and budgetary impacts would be a major impediment. An example is that optical reconnaissance satellites of conventional design cannot go very high without losing needed resolution. Using the Hubble Space Telescope to further the example, it would have a ground resolution of about 10 centimeters from 500km altitude, but only one meter from 5000km, and eight meters from geosynchronous orbit.³⁸

Ability to Form Coalitions

As was described earlier in this paper, the US has demonstrated (for example, in the Gulf War) its ability to form coalitions. This is a well-known element of peacetime deterrence. US armed forces pursue national military objectives in support of the President's integrated approaches of shaping, responding, and preparing now, which bring together all elements of national power to achieve US security objectives. The US uses military force as guided by several considerations. First, military force should be

³⁷ The author conducted these operations during both DESERT SHIELD and DESERT STORM.

³⁸ Allen Thomson, "Satellite Vulnerability: A Post Cold War Issue?" *Space Policy*, Vol. 3, No 7. (Washington D.C.: February 1995), 30.

used judiciously and decisively. Military missions must be clearly stated, with achievable military objectives that support national political aims. Second, on most occasions, US forces will operate as a joint team, harmonizing the unique and complementary strengths and capabilities of each of US Services. Third, while retaining unilateral capability, whenever possible the US must seek (for financial reasons) to operate *alongside alliance or coalition forces*, integrating their capabilities and capitalizing on their strengths. Finally, the US must ensure that the conditions necessary for terminating military involvement and withdrawing military forces are clearly established.³⁹ Insight gained from the USSPACECOM's *Long Range Plan* is that its concept of global partnership operations will provide the initiatives needed to obtain the capabilities needed to shape the space medium. Global Partnerships is a program to help shape the space medium through relationships with external, mostly non-DoD, entities, such as US allies and the commercial space sector.⁴⁰

Capacity for Self-protection

Because technological revolution knows no boundaries, hostile countries will take advantage of available space-based communication systems, navigation signals and observation products to improve their own military lethality. These trends may inevitably force the US and some of its allies to field systems for theater missile defenses, space control, space weapons and information warfare.⁴¹

³⁹ General John M. Shalikashvili, *Joint Vision 2010* (Washington D.C.: Office of the Chairman, Joint Chiefs of Staff, 1996), 7.

⁴⁰ USSPACECOM, *Long Range Plan* (1999), 17.

⁴¹ General Thomas S. Moorman, Jr., USAF Vice Chief of Staff, "The Challenges of Space Beyond 2000," (Address to the 75th Royal Australian Air Force Anniversary Airpower Conference, Canberra, Australia, 14 June 1996), 3.

As the importance of space grows and other countries begin to exploit the advantages of operating in the high ground, the next trend—controlling space—will become as important as controlling the seas or air. Eventually, an ability to protect, deny, disrupt, degrade and destroy space assets, and their related terrestrial infrastructures, must be pursued if the United States and its allies want to ensure freedom of access and action in space.⁴²

Summary

Applying the geographic CINC model for shaping regions to the space medium seems to be useful and appropriate. US armed forces help shape the international environment primarily through their inherent deterrent qualities and through peacetime military engagement. There is no reason for shaping the space medium to be different. The shaping element of US strategy helps foster the institutions and international relationships that constitute a peaceful strategic environment by promoting stability; preventing and reducing conflict and threats; and deterring aggression and coercion. All of these concepts apply to the space medium.

However, the ability of USCINCSpace and the other CINCs to carry out these duties—and in USCINCSpace's case, to implement the concepts found in the its *Long Range Plan*—will be for naught if they cannot influence overall national security policy, national space strategy, and the national-level policymaking process. This must be accomplished to provide a favorable context to enable CINCs to shape the battlespace in which they will operate. Furthermore, potential overlaps in authority and responsibility between the USCINCSpace, the military Services (particularly the Air Force) and the

⁴² Ibid. 4.

intelligence community will have to be resolved to efficiently develop and acquire space-based capabilities that most effectively support the execution of the CINC's missions.

Chapter 4

Constraints

It's clear that no credible vision for national security and economic prosperity can ignore the opportunities or the risks associated with exploiting space.

—General Richard B. Meyers

One cannot discuss the shaping activities of any CINC without a careful review of the constraints placed on the CINC politically, legally, economically, and technologically.¹ The constraints any geographic CINC has on his shaping efforts are applicable to the USCINCSpace in his shaping efforts. This chapter will discuss how these constraints apply to geographic CINCs and to the efforts of the USCINCSpace in his shaping efforts. Explanation of the institutional momentum of the Air Force is given in some detail, as it is a constraint the USCINCSpace may feel more than the geographic CINCs.

Political

Political constraints (whether perceived or real) can be difficult obstacles for the USCINCSpace to overcome in his shaping efforts. Political constraints are defined as those that are imposed on the CINC by American politicians, allied leaders, or military

¹ Michael J Muolo, *Space Handbook: A Warfighter's Guide to Space*, Vol. 1. (Maxwell Air Force Base: Air University Press, 1993), 1-47.

services. Many examples exist in the military services today. Forcing a service to purchase unneeded equipment because of the congressional district it is built in is a good example. During a conflict where a coalition is present, target selection is typically a political process. For the USCINCSpace, weaponization is a very political issue from almost all sides—congressional, services, and allies. It is an incorrect assumption that proper shaping of the space medium requires weaponization of space. The weaponization of space could play a major role (both positive and negative) in the USCINCSpace’s shaping activities. For now, suffice it to say that the USCINCSpace must have the political savvy to deal with politicians, military services, and allies in order to shape his medium.

Legal Constraints

Space forces are currently restricted from pursuing certain types of capabilities because of legal and governmental constraints such as bilateral and multilateral treaties and congressional and administrative directives. Although some activities (such as putting a military base on the moon) in space are prohibited by international law, there are few legal restrictions on the use of space for military purposes. For instance, international law implicitly permits traditional combat support functions such as surveillance, reconnaissance, navigation, meteorology, and communications to be conducted in the space medium. Additionally, international law does not prohibit space control operations or power projection from space, as long as they do not involve weapons of mass destruction. Although many laws and treaties are perceived as restricting military activities in space, few actually do. A summary is provided below:

Limited Test Ban Treaty: Signed in 1963, this treaty bans nuclear weapon tests in space. This is the only limitation placed on testing weapons in space. As long as the US does not test nuclear weapons in space, this treaty should not be considered a major roadblock.²

Outer Space Treaty, 1967: Article IV of the treaty restricts military activities in two ways. First, it prohibits placing in orbit, on the moon or otherwise place in outer space, any objects carrying nuclear or any other weapons of mass destruction. Second, it limits use of the moon and other celestial bodies exclusively for peaceful purposes by expressly prohibiting the establishment of military bases, testing weapons of any kind, or conducting military maneuvers.³

US-Union of Soviet Socialist Republics (now Russia) Anti-Ballistic Missile (ABM) Treaty: Signed in 1972, this treaty prohibits development, testing, or deployment of space-based ABM systems or components. However, the treaty does permit modeling and simulation of space assets and capabilities for analysis and experimental purposes.⁴

Environmental Modification Convention, 1978: Prohibits military or other hostile use of environmental modification techniques as a means of destruction, damage, or injury to any other state if such use has widespread, long-lasting or severe effects.⁵ If the technology existed to destructively manipulate the weather from space for instance, that would be prohibited.⁶

² Treaty Banning Nuclear Weapon Test in the Atmosphere, in Outer Space and Under Water (10 October 1963).

³ *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and other Celestial Bodies* (10 October 1967).

⁴ *Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems* (3 October 1972).

⁵ *Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques* (5 October 1978).

⁶ See Barry Coble's *Benign Weather Modification* (Air University: SAAS Thesis, June 1996).

Various strategic arms treaties also prohibit "interference" with "national technical means," such as photoreconnaissance satellites, used to verify these treaties. However, the US assumes that if space forces are used for other purposes, such as to support aggression or armed conflict, they may be valid space control targets.⁷ The latter point will become increasingly significant as countries other than the US develop space technologies.

Economic

Funding levels preclude accomplishing all that is feasible, requiring the prioritization of effort. This constraint applies to all of the CINCs. One problem the USCINCSpace faces however perhaps more than the other CINCs is that by its nature, the medium of space is expensive to access and exploit. For example, although a B-2 bomber is certainly expensive at \$1 billion a copy, that is very little when compared to the cost of developing and launching one satellite.⁸

Technology

The US must overcome many technical obstacles to make military operations using space a reality. The Air Force Scientific Advisory Board's report, *New World Vistas: Air and Space Power for the 21st Century*,⁹ outlines the technologies necessary to accomplish this objective in great detail. For instance, it currently takes 60-180 days to

⁷ Major General William R. Looney.

⁸ The Space Based Laser for example, just the cost of its experimental aspects are estimated to be between 2 and 3 billion dollars. Check the program office website for the latest estimate.
<http://www.sbl.losangeles.af.mil>.

⁹ USAF Scientific Advisory Board, "Summary Volume," *New World Vistas: Air and Space Power for the 21st Century* (Report to the USAF Chief of Staff, Washington, D.C.: Government Printing Office, December 1995).

prepare the launch vehicle and its associated payload for launch.¹⁰ However, reusable launch systems, when developed, should minimize this technological constraint. Payload pre-launch processing, positioning and on-orbit checkout will have to be addressed to fully minimize these constraints as well.

Institutional Momentum

Perhaps most difficult of all the constraints imposed on the USCINCSpace in his shaping efforts, however, is that the Air Force must overcome its own institutional momentum.¹¹ In making the transition to power projection from space, the Air Force (as the lead space agent) may find that the most difficult impediments to overcome are those internal to the Air Force itself. This impediment must be removed to start building the framework for space combat operations should they be required to shape the medium. Space combat operations have the potential to guide the technological development of space assets in much the same way as daylight precision bombardment guided Air Force thought and aircraft development prior to World War II.¹²

Large bureaucracies are notoriously slow to change. The government is probably the slowest of these large bureaucracies, because unlike a corporation facing major change, it has no profit motive.¹³ These large bureaucracies are also slow to divest themselves of portions of the organization that are no longer relevant to their operations in a new environment. As Major General (Retired) Perry M. Smith said in his book, *Taking*

¹⁰ Major General William R. Looney, *Space Warfare: Not How But When?* (Briefing given to the Air War College, 10 Apr 2000).

¹¹ For an in-depth analysis see James Smith's *USAF Culture and Cohesion: Building an Air and Space Force for the 21st Century* (USAF Academy, Colorado: Institute for National Security Studies, June 1998).

¹² Major General William R. Looney, *Space Warfare: Not How But When?* (Briefing given to the Air War College, 10 Apr 2000).

¹³ See Perry M. Smith, *Taking Charge: A Practical Guide for Leaders* (Washington, D.C.: National Defense University Press, 1986), 121.

Charge: A Practical Guide for Leaders "[in] government, divestiture is a more difficult process because the obsolete areas are harder to identify and more difficult to exorcise from the organization."¹⁴

Crossing the bureaucratic bridge to allow combat operations in space will be a difficult transition for the US Air Force. The Air Force might experience difficulty because of the new method of warfighting it creates and because those new methods will at some point replace old ones which have been the foundation of the institution since its inception. The change may not be immediate, but once the threshold is crossed, there will be no going back. Just as there are no longer cavalry soldiers on horseback, one day there will no longer be bomber or fighter pilots in the cockpit. However, unlike the disappearance of these older forms of warfare, the decision that the time is right to move from an air force to a space force will likely be made by the more innovative Air Force leaders who grew up in the organization, living and breathing the types of fighter and bomber aviation which space warfare will ultimately replace.

In the end, the question may not be whether the US is ready to overcome the legal, economic, and political hurdles to conducting combat operations in space; rather, is the Air Force ready to give up the primacy of fighter and bomber aviation and change its institutional mindset to meet a new strategy? As the nation's primary provider of air and space power, the Air Force must adapt to the strategic needs that space warfare will bring to the nation. The changes required for this "adaptation" are, of course, for another study.

¹⁴ Ibid., 122.

Summary

There are many constraints the USCINCSpace, like geographic CINCs, must overcome in order to shape the space medium. None of these constraints, however, is insurmountable. When shaping the space medium becomes politically acceptable, adequate funding is provided to develop the required technologies, and people realize there are no legal reasons for not shaping the medium; the CINC should be able to do what is required. However, as the institutional momentum of the Air Force (the US's leading space force) appears to be a major impediment to being able to shape the medium, perhaps the majority of US space responsibility should be turned over to another Service.

The Air Force Chief of Staff once said, "Space is a place, not a mission."¹⁵ If that is true (and leaders believe it) then the future security of the United States is in jeopardy as our enemies will no doubt see it as a mission. In 1994, the secretary of the Air Force and the chief of staff challenged the Air Force Scientific Advisory Board to "search the world for the most advanced aerospace ideas and project them into the future."¹⁶ Among the many valuable assertions in the resulting *New World Vistas* report was the following conclusion:

For the U.S. to sustain its superpower status it will become necessary not only to show global awareness through space based information, but also to be able to project power from space directly to the earth's surface or to airborne targets with kinetic or directed energy weapons.¹⁷

¹⁵ General Michael E. Ryan, *Beyond the Horizon: Realizing America's Aerospace Force* (Remarks to the Annual Space Symposium, Air Force Association, Los Angeles, California, 19 November 1999).

¹⁶ Sheila E. Widnall, SECAF, "The Challenge," *New World Vistas: Air and Space Power for the 21st Century* (Washington D.C: USAF SAB, 1995), 7.

¹⁷ *Ibid.*, 7.

In order for this type of activity to occur the USCINCSpace must be given full authority to shape his region. In other words, he must overcome the constraints and obstacles before him. Does this mean that the USCINCSpace should weaponize his medium? Not necessarily, but he should be able to if it is in the best interests of the United States.

Chapter 5

Conclusions

Whoever has the capability to control space will likewise possess the capability to exert control of the surface of the earth.

—General Thomas D. White
Air Force Chief of Staff, 1957

At one time, demonstrated accomplishment in space was thought to confer prestige on a nation that could be directly translated into international influence. Today, leadership in space assumes a different, more focused dimension. The best means of influencing the evolution of the international regime in space as a response to emerging political, economic, and military challenges in space is leadership.¹ The only way the US is going to maintain its perceived leadership in space is to continue on-going shaping activities in the medium. The best way to conduct these and future shaping activities is to fully embrace the geographic CINC's shaping model.

Promoting Stability

The advantages to the United States of operations in space are so significant that future adversaries are likely to target them. In the year 2000, roughly twenty nations

¹ Frank G. Klotz, *Space, Commerce, and National Security* (New York: Council on Foreign Relations Paper, 1998), 47.

have access to space.² In order to have a stable global environment, the US (specifically the USCINCSpace) must take the lead in all efforts to shape the space medium. Before shaping the medium for the world, however, the CINC must take care of the US. This paper argues that the USCINCSpace will need options ranging from diplomatic to more forceful alternatives in order to deter and protect against attacks on friendly space systems, and, if necessary, to shut off the flow of space capabilities to adversaries. Although not written down, the CINC's highest priority should be protecting his own assets. USCINCSpace plays a critical role in the US's national security. Whether in a supporting role to the "warfighter" or as the shaper of his region, the USCINCSpace must do everything necessary to ensure US national security.

Preventing and Reducing Conflicts and Threats

The spread of indigenous military and intelligence space systems, civil space systems with military and intelligence utility, and commercial space services with military intelligence application poses a significant challenge to US defense strategy and military operations. Because of the value of space systems to the US economy and the military in future conflicts, the United States may experience attacks against US and allied space systems. Consistent with treaty obligations, the USCINCSpace must be able to ensure freedom of action in space for friendly forces and, when directed, limit or deny an adversary's ability to use the medium for hostile purposes. To support space control objectives, the USCINCSpace must assure the availability and effectiveness of all mission critical space activities. To this end, he is reviewing the adequacy of

² USAF Scientific Advisory Board, "Space Technology Volume," *New World Vistas: Air and Space Power for the 21st Century* (Report to the USAF Chief of Staff, Washington, D.C.: Government Printing Office, December 1995), iii.

protection afforded space assets. The DoD also has initiated a Technology Development Program that will enhance the security, survivability, and operational continuity of space systems, including both ground link and orbital segments. Moreover, the USCINCSpace must be involved in arms control discussions regarding space technology in order to ensure potential enemies aren't obtaining technologies that will be used later against the US. In order to prevent or reduce the causes of potential conflict, the US must have the capability to deny an adversary's use of space systems to support hostile military forces.³

Peacetime Deterrence

Only with credible offensive and defensive space control will the US deter and dissuade its adversaries, reassure allies, and guard its nation's growing reliance on global commerce. Without it, the US will become extremely vulnerable.⁴ This doesn't necessarily require the deployment of space-based weapons. Any satellite that can be maneuvered in such a way as to collide with another satellite could theoretically be used for "anti-satellite" purposes.⁵ The US's ability to form coalitions is not flawless but is considered excellent even by its adversaries. Coalitions place the US in strategic positions that allow for interruption of enemy ground-based targets that could eliminate the effective use of space assets by their enemies. This "strategic positioning" is a way, other than deploying forces in space, to project military power.

³ William S. Cohen, *Annual Report to the President and the Congress* (Washington D.C.: Office of the Secretary of Defense, 2000), 97.

⁴ Alvin and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century* (Boston, Massachusetts: Little, Brown Company, 1993), 3.

⁵ Klotz, 28.

Summary

The vantage of space provides the US with both opportunity and advantage. To relinquish the advantage is to let opportunity pass, to resign ourselves to becoming disadvantaged.⁶ By using the Regional CINC model for shaping his medium, the USCINCSpace can maximize the chances that the US will not become "disadvantaged." By promoting stability, preventing and reducing conflicts/threats, and peacetime deterrence, the USCINCSpace can shape the medium of space in a way that is favorable to the US.

⁶ Jay W. Kelley, "Space Is More Than a Place," *Airpower Journal*, Vol. 10. No.2. (Maxwell AFB, Alabama: Air University Press, Summer 1996), 97-102.

Chapter 6

Recommendations

Space is a place, not a mission.

—General Michael E. Ryan
Air Force Chief of Staff, 1999

The USCINCSpace should adopt the use of the geographic CINC Model as it is described in the US National Military Strategy for shaping the space medium. Every regional CINC uses an adaptation of this shaping model and there are no foreseeable reasons why the USCINCSpace cannot adapt it for his use.

Regional CINCs adapt the model by describing their shaping methodologies in their Theater Engagement Plan. The USCINCSpace should describe his shaping methodologies in his *Global Theater Engagement Plan*. Currently, the GTEP explains how the USCINCSpace will support the geographic CINCs. Although a useful document, the GTEP doesn't take the place of the required *Space Engagement Plan* (SEP).

Space Engagement Plan

The USCINCSpace should develop a Space Engagement Plan that reflects the shaping activities occurring in the space medium. This plan would be similar to the *Theater Engagement Plan* that the geographic CINCs develop. The process of

developing the SEP would be a valuable tool in finding potential gaps in the CINC's shaping efforts. Unlike the *Global Theater Engagement Plan*, the SEP would contain information regarding the details of the USCINCSpace efforts in the space medium.

Technology

As one senior military official recently lamented, military and civilian satellites as a rule do not even have on-board systems to signal if and when they have been deliberately attacked: "We have ways of telling something happened to the satellite, but why did it quit? Did it quit because of fatigue, or an electromagnetic pulse from space, or because somebody lased it? We can only make an educated guess."¹ General Estes is absolutely right—there must be a diagnostic capability developed for all new satellites being deployed in order to relay back to their respective ground stations if they have come under attack. The USCINCSpace should support the immediate acquisition of such technologies for all future satellite deployments.

Constraints

Whether any or all of the space systems discussed in this paper and others² will eventually be deployed is uncertain and depends as much, if not more, on political will as on technological developments. However, with a capability to take actions beyond diplomatic and traditional military measures, the United States would be in a stronger position to deter adversaries from interfering with friendly satellites and, at the same time, have added clout to persuade foreign countries or firms to voluntarily refrain from

¹ General Howell Estes, recently retired CINC of USSPACECOM, quoted in "Information Warfare Update," *Aviation Week & Space Technology*, August 10, 1998, 22.

delivering space goods and products to its enemies. If all else fails, the United States would also have the means to take action to stop its adversaries from using space in support of operations against American and allied forces.³ In order for this to become a reality however, the political barriers will have to be put aside. Therefore, the USCINCSpace should begin negotiations on all political fronts to ensure he can shape his medium. An example is an education program clearly explains the treaties and international laws to the public and the US Congress as well as their effects on USCINCSpace shaping efforts.

Space as an AOR

The Unified Command Plan is currently under review and as written gives the USCINCSpace almost all of the responsibilities of a geographic CINC. The three exceptions are: noncombatant emergency evacuation, peacekeeping, and humanitarian relief. These are hardly reasons to prevent space from being designated as an AOR. The AOR designation is important because it would give the USCINCSpace the authority to do what the regional CINCs do to shape their regions. Although some of those actions, like deploying forces, require presidential approval, but most don't. USSPACECOM UCP responsibilities are an important step in military operations in space. Since responsibilities have been authorized for both a functional and regional unified command, some people would argue that space is a de facto AOR. All one has to do is codify that fact within the UCP framework to derive the full implications of a space AOR.

² See William Spacy, *Does the US Need Space-Based Weapons?* (Maxwell AFB, Alabama: Air University Press, 1999).

³ Klotz, 34.

Space Policy

Currently, many government offices have influence on space policy. In a recent testimony before Congress, the Director of the National Reconnaissance Office said he was the single focus for space policy, but that has yet to be seen.⁴ Table 1 shows the plethora of government bureaucracies who have influence on space policy.⁵ The USCINCSpace should support the Director of the NRO as the single focus for space policy and establish a liaison officer to work with that office.

The Space Mission

Space will not be a passive sanctuary in future conflicts as some contend it should.⁶ This means that the United States has little choice but to weaponize space or develop the capabilities to affect an adversary's space assets from the ground. If the US goal is "to keep [its] own freedom of action in space while denying it to the enemy,"⁷ the US must develop the capability to disrupt, destroy, deny, and degrade enemy space systems and ground based control systems.⁸

⁴ See USSPACECOM's *Legislative Update* (3 May 2000).

⁵ Adapted from Klotz, 53-54.

⁶ See Karl Mueller, *Space Weapons and US Security: The Dangers of Fortifying the High Frontier* (Paper for the Annual Meeting of the American Political Science Association, September 1998).

⁷ USAF Scientific Advisory Board, "Space Technology Volume," *New World Vistas: Air and Space Power for the 21st Century* (Report to the USAF Chief of Staff, Washington, D.C.: Government Printing Office, December 1995), 8.

⁸ *Ibid.*, ix.

Table 1: Offices Influencing Space Policy

Executive Office of the President
Office of the Vice President
Office of Science and Technology Policy
Office of Management and Budget
Office of the U.S. Trade Representative
National Science and Technology Council
National Security Council
National Aeronautics and Space Administration (NASA)
Department of Commerce
National Oceanic and Atmospheric Administration (NOAA)
Department of Defense
U.S. Space Command
Army, Navy, Air Force, and Marine Corps
National Reconnaissance Office
National Security Agency
National Imagery and Mapping Agency
Defense Advanced Research Projects Office
Defense Information Systems Agency
Ballistic Missile Defense Office
Department of Transportation
Office of Commercial Space Transportation, Federal Aviation Administration
Department of State
Office of Defense Trade Controls
Central Intelligence Agency
Federal Communications Commission (FCC)

(Adapted from Frank G. Klotz, *Space, Commerce, and National Security* (New York: Council on Foreign Relations Paper, 1998), 53-54.

To reach this goal, the USCINCSpace must develop acquisition strategies to accomplish three very specific space missions: space surveillance, space negation, and space protection.⁹

To enhance space surveillance, the US must develop and maintain the capability to observe each satellite throughout its entire orbit, giving the United States knowledge of all enemy satellites. This is a short step towards the ability for each US satellite to protect itself. The US must develop the capability to deny a potential enemy the use of its space assets. Limiting an adversary's access to space would be one way to accomplish this mission, while another method would be to deny the enemy the capability to control satellites in space. Still another method would be to degrade an individual satellite's ability to sense the information the enemy tasks it to collect. The US must develop the capability to deny freedom of action to the enemy in each of these areas. Additionally, the USCINCSpace should develop the means to reverse the effect of at least some space denial weapons, including, for example, the capability to restore an enemy's satellites to their pre-conflict status.

Finally, the Air Force (as the US's lead space service) must develop the capability to protect US space assets from enemy attempts to control the space environment. This includes the physical protection of assets in space as well as space systems that reside on the earth. In addition, the US Air Force must make a conscious decision about its role in the future of space warfare and its role as the lead service for space. Just as the United States is transitioning from using space assets to support combat operations on the surface of the earth to using space assets to conduct combat operations in space, the Air

⁹ Ibid., ix.

Force must begin the transition to providing this type of war fighting capability or give it to another service.

Abbreviations

AFM	Air Force Manual
AOR	Area of Responsibility
AU	Air University
CADRE	College of Aerospace Doctrine, Research, and Education
CCAF	Community College of the Air Force
CJCS	Chairman of the Joint Chiefs of Staff
DCI	Director of Central Intelligence
DoD	Department of Defense
DDS&P	Deputy Directorate for Strategy and Policy
GPS	Global Positioning System
GTEP	Global Theater Engagement Plan
IMET	International Military Education and Training
MOR	Medium of Responsibility
NASA	National Aeronautics and Space Administration
NCA	National Command Authority
SAAS	School of Advanced Airpower Studies
SEP	Space Engagement Plan
TEP	Theater Engagement Plan
UCP	Unified Command Plan
USAF	United States Air Force
USCINCSpace	United States Commander-in-Chief for Space
USSPACECOM	United States Space Command

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